The National Child Measurement Programme: Its Value and Impact

BY

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DECLARATION

I hereby declare that the work presented in this thesis is my own and that, to the best of my knowledge and belief, it has never been published or presented for the award of any other degree or diploma of the university or other institute of higher learning.

Signed…….. Date……..

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Signed …… Date ……..…

DEDICATION

This thesis is dedicated to my beloved parents Mr & Mrs Mawejje who tirelessly struggled to educate me. May the almighty God reward you abundantly.

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LIST OF ACRONYMS AND ABBREVIATIONS

ANOVA	Analysis of Variance
BMI	Body Mass Index
BMR	Basal Metabolic Rate
CAGE	Child Age
CBCL	Child Behaviour Check List
CDC	Centres for Disease Control and Prevention
CES-D	Centre for Epidemiological Studies Depression Scale
CHASE	Centre for Health And Social Evaluation
CI	Confidence Interval
CID	Child Identification
CINAHL	Cumulative Index to Nursing and Allied Health Literature
COI	Cross-government Obesity Unit
Cos	Because
CSEX	Child Sex
DASS	Depression Anxiety Stress Scale
Df	Degrees of freedom
DH	Department of Health
DHS	Dietary Habbits Score
DXA	Dual Energy X-ray Absorptiometry
Et al	And others
Etc	Etcetera (and other things)
FAS	Family Affluence Score
FBBT	Family Based Behavioural Treatment
FFM	Fat Free Mass
FHS	Feeding Habits Score
GCSE	General Certificate of Secondary Education
GDP	Gross Domestic Product
GHQ	General Health Questionnaire
GP	General Practitioner

HCC	Health Care Communities
HM	Her Majesty
HMSO	Her Majesty's Stationery Office
IC	Information Centre
IOTF	International Obesity Task Force
IQ	Intelligence Quotient
Kg	Kilogram
KJ	Kilojoule
LSS	Life Satisfaction Score
Max	Maximum
MCSD	Marlowe-Crowne Social Desirability
MEND	Mind, Exercise, Nutrition, Do it
Min	Minimum
MRI	Magnetic Resonance Imaging
NCMP	National Child Measurement Programme
NHANES	National Health and Nutrition Examination Survey
NHS	National Health Service
NICE	National Institute for Clinical Excellence
NLYS	National Longitudinal Youth Survey
Ofsted	Office for standards in education
ONS	Office of National Statistics
OR	Odds Ratio
p	Probability
PAL	Physical Activity Level
PAS	Physical Activity Score
PCT	Primary Care Trust
PE	Physical Education
PSA	Public Standards Agency
Q-Q	Quantile - Quantile
QUAL	Qualitative

QUAN	Quantitative
SD	Standard Deviation
SDQ	Strengths and Difficulties Questionnaire
SEAL	Social and Emotional Aspects of Learning
SES	Self Esteem Scale
SHAs	Strategic Health Authorities
SOTW	South of Tyne and Wear
SPSS	Statistical Package for Social Sciences
SSS	Societal Support Score
TEE	Total Energy Expenditure
TRF	Teacher Report Form
TV	Television
UK	United Kingdom
US	United States
USA	United States of America
WHO	World Health Organisation
YSR	Youth Self Report

LIST OF OPERATIONAL DEFINITIONS

Childhood obesity	A condition where excess body fat negatively affects a child's health or wellbeing. On the child questionnaire, the term 'very overweight' was used instead of 'obese' to avoid causing distress to the obese children.
Child	Anyone below 18 years old.
Depression	A type of mental disorder that dampens a person's mood. It can affect people's thoughts, feelings, behavior, and overall health.
Junk foods	Foods that are high in energy but low in nutritional value
Ideal weight status	This term was used to refer to the weight status within the normal range. Through the thesis, the terms 'normal weight' and 'healthy weight' have not been used to avoid misinterpretation. However on the child questionnaire, the term 'normal weight' was used as it was thought that children would find it more comprehensible than 'ideal weight'.
Mental health	A state of wellbeing in which the individual realizes his or her own abilities, can cope with the normal stresses of life, can work productively and fruitfully, and is able to make a contribution to his or her community.
Mental problems	A pattern of behaviour or psychological function that occurs in an individual that is unexpected in normal development. Through this thesis, this term has been used to refer to mental harm and mental disorders.
Mixed methods research	An investigation that uses both qualitative and quantitative approaches together in one project.
Moral panic	A delusional feeling that develops within a population that something could threaten its survival
Self-esteem	A person's subjective appraisal of himself or herself as intrinsically positive or negative to some degree.
Stigmatisation	An act of branding in a manner that discredits the affected individual.

ABSTRACT

Background

Rising rates of obesity among children have become one of the most pressing issues in modern public health. Childhood obesity threatens both the mental and physical well-being of children. Attempts to halt the rise in obesity take many forms, but one of them is the recent implementation of a programme of measurement of primary children at reception and in year 6, with results being fed back to parents. This National Child Measurement Programme (NCMP) is controversial and has been criticised in some quarters as unethical, in being a form of screening programme with no clear or effective interventions available for those detected as having a problem.

Study aims and objectives

The main aim of the study was to explore the relationship between weight status and children's mental wellbeing, especially in the context of the NCMP. Within this overall aim, key specific objectives of the study were: i) to investigate the association between weight status of 10-11 year old school children and their mental well-being; ii) to assess the impact on the mental wellbeing of children, of participating in the NCMP; and iii) to collect information about parents'/guardians' and children's reaction to the NCMP, with particular interest in identifying whether parents/guardians and their children found the feedback useful in moving towards the adoption of a healthy lifestyle.

Methods

The study was undertaken in primary schools in the catchment area of Gateshead Primary Care Trust (PCT). The overall study used a mixed methods study design. The study involved administering a questionnaire prior to NCMP measurement to a total sample of 264 children, sampled using a proportionate stratified random sampling technique. One-to-one semi-structured interviews were also conducted post measurement with 21 children purposively sub-sampled from the larger group, and with 16 parents/guardians.

Results

Prior to measurement, most children misclassified their weight status. About 1 in 10 children who were of ideal weight perceived themselves as overweight. Over three quarters of overweight children perceived themselves to be of ideal weight. There was no significant relationship between any of the indicators of mental wellbeing and actual weight status of children. However, there was very strong evidence for a

significant relationship between perceived weight status and mental wellbeing among children. Seven major themes emerged from the post measurement interview data, but perhaps the most intriguing was the cycle of emotional reaction of families to the NCMP and weight feedback.

Discussion

The reactions of parents/guardians whose children are indicated to have weight problems follow a sequence of behaviours ranging from shock, disgust with the programme, through denial and self-blame to acceptance, worry and help seeking. Reasons for these responses relate in many cases to the way the weight problem is portrayed to the parents. While health authorities are keen to portray this problem as a medical one, parents/guardians see it as social one. The roots of overeating and lack of exercise are seen as lying in the complex social and cultural milieu in which this sample of people live. Consequently, associating this problem in feedback letters with dangerous diseases like cancer, and advising parents to visit GPs to resolve child weight issues, seems inappropriate to the recipients and causes controversy and anger.

Conclusion

The NCMP's routine feedback could potentially induce families into the state of readiness to change lifestyle behaviours; however, given the reactions described in this study, it seems critical to avoid placing blame on individuals but rather to acknowledge the influence of the environment surrounding families and to provide non-medical support aimed at bringing families on board to support interventions for combating child weight problems.

Chapter 1 – INTRODUCTION

1.1 Overview

This chapter introduces the study, which was conducted in primary schools in Gateshead Primary Care Trust (PCT) catchment area. It sets the scene by briefly outlining the background of the study; it then proceeds to discuss the rationale for undertaking it. The aims and objectives of the study are then described before outlining the structure of the thesis. Throughout this thesis, the study has been referred to as 'the current study' and summary boxes outlining key messages have been used at the end of each major section.

1.2 Background

Rising rates of obesity among children have become one of the most pressing issues in modern public health (Ells *et al.,* 2008; Heslehurst, 2011; Lee, 2009; Summerbell *et al.,* 2005; Romon *et al.,* 2009). Worldwide there has been a rise in the prevalence of childhood obesity in the past three decades (Han *et al.,* 2010). The rapid shift in the weight of children in the UK towards overweight and obese status over the past decades threatens both the mental and physical well-being of children as well as significantly reducing their quality of life and – ultimately – their overall life expectancy (Luttikhuis *et al.,* 2009; WHO, 2008; Wilkinson *et al.,* 2007). A growing body of research indicates that the obesity-related physical health consequences (e.g. cardiovascular diseases, insulin resistance, metabolic syndrome, type 2 diabetes mellitus) that affect obese and overweight adults are now known to affect obese and overweight children too (Anderson and Butcher, 2006; Daniels, 2009; Srinivasan, 1996). Moreover obese children are more likely to remain obese in adulthood, and childhood obesity has been shown to predict ill health later in adult life (Summerbell *et al.,* 2005).

1.3 Rationale of the study

In light of the known consequences of childhood obesity, the UK Government has attempted to monitor and/or halt the rise in childhood obesity using different strategies. One of them is the implementation of a programme of measurement of year 6 primary school children, with results being fed back to parents along with a recommendation for action to remedy problems where obesity is detected (Shucksmith *et al*., 2009). This National Child Measurement Programme (NCMP) is

controversial and has been criticised as unethical in being a form of screening programme with no clear or effective interventions available for those detected as having a problem (Ikeda *et al.,* 2006; Westwood *et al.,* 2007). Consequently critics have voiced the fear that a measure taken to promote better physical health in children may inadvertently result in poorer mental health, with both parents and children feeling stigmatised and anxious about the child's weight status (Howard, 2007). One significant but under researched further question to address here is what impact does telling parents/guardians and children a child's weight status have on the child's mental-wellbeing? Aphramor (2009) and others have discussed the stigmatising potential for such activity and have posited an impact on children's self-esteem, but there have been few studies which followed children and parents/guardians through the measurement and feedback process to see if this is indeed an outcome that can be expected in a majority or minority of cases.

Furthermore, while the impact of childhood obesity on the physical health of children has been well studied and understood, little has been done to establish a clear understanding of the association between childhood obesity and the mental well-being of children (Griffiths *et al.,* 2010; Hill and Lissau, 2002). Despite the increasing international concern and call to give children's mental well-being top priority (Konu and Lintonen, 2006; Spratt *et al.,* 2006; WHO, 2008), it has remained an area very poorly studied and understood (Wardle, 2005).

The current study was therefore developed to provide more robust empirical evidence for the actual association between weight status and mental well-being of children, and the impact on the mental wellbeing of children and their families of participation in the NCMP. It was also designed to collect information about parents'/guardians' and children's reaction to the government's new NCMP; with particular interest in identifying whether parents/guardians and their children feel the NCMP contributes to improving children's wellbeing or helps support both the parents/guardians and their children in adopting a healthy lifestyle.

1.4 Context of the study

The context of the current study lies in the aftermath of the publication of the Foresight report which emphasises the complexity of attempts to tackle obesity. In 2007, the UK Government commissioned the Foresight programme to identify possible ways of tackling obesity in society over the next 40 years. This task brought together over 300 experts and stakeholders from a wide range of disciplines

to identify the issues leading to the rapid increase in obesity in the UK observed over the previous decades, and to suggest plausible solutions to tackle the problem. In their report, Butland *et al* (2007) recognized the complexity of the factors surrounding obesity both in children and adults. They pointed out that the current rise in obesity cannot be attributed to a single cause and likewise cannot be solved by a single approach. It seems clear that obesity is a product of a multitude of factors and consequently tackling it will require multidimensional approaches.

The changing trends in food production, built environment, working patterns, selling of food and technological advancement witnessed in the recent decades could be influencing the rapid increase in obesity. These factors are part of modern lifestyle and reversing them is almost impossible. The impact of these factors on obesity development is further exacerbated by socio-economic differences – a complex issue to tackle in society. Butland *et al* (2007) have therefore predicted that it is quite likely that by 2050, the UK could have over half of its population obese. That said, it is worth noting that this estimation was based on earlier prevalence rates which showed a consistent rise in obesity. Currently, it has been indicated by the recent data that obesity levels especially in children could be leveling off (this is further explored in Chapter two). Nevertheless, the prevalence of obesity among populations is still high enough to attract attention.

There is no doubt that obesity needs to be tackled by preventing the increase in the number of people becoming obese, whilst treating those who are already obese; although the Foresight report (2007) has identified this task to be incredibly challenging. The main debate centres on whether obesity should be considered a medical problem requiring medical solutions, or as a social problem requiring society based interventions. This debate is pivotal to the implementation of any interventions geared towards combating obesity, for instance the reactions of people to the feedback of the NCMP would very much depend on how the obesity problem is portrayed, as reflected in documents like the feedback letters and so on. For children particularly, we don't know whether interventions aimed at combating obesity would inadvertently impact on their mental wellbeing, given the paucity of the evidence associating child weight issues and mental wellbeing. To this end, Butland *et al* (2007) have supported the need for more robust studies into the different aspects of obesity in order that better understanding of its complexity may be achieved. These arguments highlight the context in which the current study has been undertaken.

1.5 Aims and objectives of the study

The main aim of the study was to explore the relationship between weight status and children's mental wellbeing, especially in the context of participation in the NCMP.

Specific objectives of the study included:

i) To determine the weight status and mental wellbeing of selected 10-11 year old school children in the North-East of England pre participation in the NCMP.

ii) To investigate the association between weight status of 10-11 year old school children and their mental well-being.

iii) To identify other factors that impact on the mental-wellbeing and weight status of school children.

iv) To investigate the correlation between the Strength and Difficulties Questionnaire (SDQ) and General Health Questionnaire (GHQ) in measuring mental wellbeing among children.

v) To assess the impact on the mental wellbeing of children, of participation in the NCMP.

vi) To collect information about parents'/guardians' and children's reaction to the NCMP, with particular interest in identifying whether parents/guardians and their children found the feedback useful in moving towards the adoption of a healthy lifestyle.

1.6 Structure of the thesis

The thesis consists of eight chapters, each discussing a different aspect of the study. Chapter one provides a brief background to the study, identifying the rationale, aims and objectives and the significance of the study. Chapter two presents the literature review, focusing on childhood obesity, child mental wellbeing and the monitoring and use of surveillance programmes such as the NCMP. Chapter three details the methodology or approach used in the study. It identifies the philosophical underpinnings of the mixed methods approach chosen for this study; while making a case for the justification of this choice for this particular study. Chapter four describes the actual methods used to select participants and to collect the data for this study. It considers some ethical issues as well as outlining the method of data analysis for both qualitative and quantitative data collected. Chapter five summarises the quantitative survey findings in tables, figures and text, identifying key descriptive and inferential statistical results. Chapter six presents

qualitative findings from one-to-one semi-structured interviews conducted with parents/guardians and children. It utilises key verbatim comments to support the arguments in the chapter. Chapter seven discusses the findings of the study, integrating both qualitative and quantitative findings and identifying corroborations, contradictions and complementarity. Throughout the chapter reference is made to the available literature and, towards the end of the chapter, the limitations of the study are outlined. Chapter eight presents the conclusion to the thesis, summarising the entire study and discussing its implications, recommendations and suggestions for further research.

Box 1.1 Summary of key messages in the introduction chapter

- The rapid increase in childhood obesity is acknowledged as a threat to the physical wellbeing of children in the UK, since obese and overweight children tend to carry their condition into adulthood.
- The UK government implemented the NCMP as part of its attempt to halt the rise in childhood obesity.
- The NCMP has been criticised by some as being unethical, since some claim it now takes the form of a screening programme with no clear effective interventions for those detected as having a problem.
- It is not known what impact participating in the NCMP could have on the mental wellbeing of children and parents.
- Little is known about the association between childhood obesity and mental wellbeing of children.
- The factors surrounding the onset of obesity both in children and adults are complex; and the aetiology of obesity cannot be attributed to a single cause.
- The current study explores the association between weight status and children's mental wellbeing, especially in the context of participation in the NCMP.

Chapter 2 – LITERATURE REVIEW

2.1 Overview

This chapter presents a critical narrative review of the available literature in order to further contextualise the current study and to identify the gaps in knowledge that the study seeks to fill. This chapter explores literature in three main areas namely:

- Childhood obesity and overweight
- The National Child Measurement Programme
- Mental health in children

Searching was undertaken through key words (e.g. 'childhood obesity', 'childhood overweight', 'child mental health', 'child mental wellbeing' 'universal programmes' and so on) using electronic library databases (e.g. Medline, psych-INFO, Cochrane library, CINAHL, PubMed and so on), followed by hand searching of articles identified in the bibliography of the obtained papers. All kinds of studies were reviewed as appropriate for review, including grey literature and some policy papers. The review identifies the relationship between obesity and mental health in children as being of great importance, yet scant evidence exists to support the existence and direction of this relationship especially in the context of participating in the NCMP. The review therefore concludes by indicating the need for further robust studies in this area.

2.2 Assessment of childhood obesity and overweight

Over the past decades, childhood obesity has drawn significant attention from researchers and health professionals in both the developed and developing countries. Primarily childhood obesity is defined as a condition where a child has excess body fat which may cause ill health (Ahmad *et al.,* 2010; Campbell and Haslam, 2005; Dehghan *et al.,* 2005; Reilly, 2007; The National Health Service Information centre, 2010). Technically however, there has been a lot of controversy about the definition (Cole *et al.,* 2000; Dehgan *et al.,* 2005; Lee, 2009; Mavrakanas *et al.,* 2009). To date, for instance, there is no agreed percentage cut off point at which 'excess' should be recognised (Cole *et al.,* 2000; Mavrakanas *et al.,* 2009). In adults, the cut off point for obesity is determined as the percentage body fat at which the risk of weight – related illness is initiated; this is worked out from life insurance statistics (Low *et al.,* 2009). However in children, cut offs are determined on the basis of population distribution, not related to risk of ill health. This has made it

increasingly difficult to determine the cut off point with any precision in children (Cole *et al.,* 2000; Lee, 2009).

Categorising children in the different weight status groups cannot be based on observation alone. In a study by Smith *et al* (2008), for example, health care professionals asked to rate the weight status of children in England by observation of photographs misjudged most obese and overweight children to be of ideal weight. Spurrier *et al* (2006) conducted a similar study in Australia and found in that case, however, that health care professionals overestimated obesity and overweight, identifying most children with ideal weight as overweight and obese. These studies provide evidence for the need to rely on objective measurements, rather than subjective observations, in assessing the weight status of children.

A number of methods have been used in determining child weight status for population surveillance and clinical purposes. Some of these methods measure weight, while others measure body fat. Whether child weight status should be based on measurements of weight or on estimates of body fat is a dilemma that many studies have had to contemplate (Flegal *et al.,* 2006; Sweeting, 2007). To understand the dilemma in defining child weight status, it is necessary first to explore the common methods used in determining body composition. In their review, Wells and Fewtrell (2006) grouped these methods into four broad categories namely: multicomponent methods, two-component methods, predictive methods and simple measurement methods. The next section discusses these categories.

2.2.1 Multi-component methods for assessing body composition

These methods divide body weight into different components, for instance the three-component methods divide body weight into fat-free mass, water and fat, whereas the four component methods further divide fat-free mass into protein content and minerals. These methods are regarded as the most accurate in estimating body composition and are often taken as the 'gold standard' against which the other methods for estimating body composition are compared (Wells and Fewtrell, 2006). Despite their accuracy, these methods are rarely used in epidemiological studies. This is due to the fact that they are not only expensive, but are also sophisticated, requiring specialist knowledge to operate.

2.2.2 Two-component methods for assessing body composition

These methods divide body composition into two main components namely fat-free mass and fat mass. These techniques are based on an assumption that fat-free

mass is constant for individuals of a given age and sex. This assumption could be true for healthy individuals; however, it might not be true for individuals with chronic illnesses (Wells and Fewtrell, 2006). The two component methods for assessing body composition include dual energy x-ray absorptiometry (DXA), densitometry, hydrometry and magnetic resonance imaging (MRI). Although these techniques provide a considerable level of accuracy in estimating body composition, they have not been widely used in epidemiological studies. This, in part, has been due to the fact that they are expensive and need specialist expertise to operate.

2.2.3 Predictive methods for assessing body composition

These methods involve use of mathematical equations to predict body composition (Wells and Fewtrell, 2006). Two specific techniques, under the predictive methods, namely skinfold thickness and bio-electric impedance analysis, are discussed in the sections that follow.

2.2.3.1 Skinfold thickness method

Skinfold thickness is an indirect method of estimating percentage body fat (adiposity) in adults and children (Akinpelu *et al.,* 2009; Ludescher *et al.,* 2009; Sardinha *et al.,* 1999). This method involves pinching the skin of an individual slightly so that the skin bulges between the thumb and the fore-finger. This bulge is then measured using callipers. The measurements are then entered into various equations to calculate the percentage body fat (Sarria *et al.,* 2001). In essence, this method measures the sub-cutaneous fat at different sites on the body, for example the upper arm, the abdomen, the thigh and below the scapula (Deurenberg *et al.,* 1990). It has been widely used in estimating body fat percentage in children due to its easy applicability (Sarria *et al.,* 2001); yet many studies have cast doubt on its validity and reliability (Davis and Lucas, 1989; Reilly *et al.,* 1994; Reilly *et al.,* 1995).

In a study to validate skinfold thickness method, Reilly *et al* (1995) compared the five equations used to estimate percentage body fat using measurements of skinfold thickness with hydro-densitometry on a sample of 98 children who had not yet reached puberty; the study concluded that the skinfold thickness measurement method was not valid and they discouraged its use in estimating percentage body fat in children. Also Deurenberg *et al* (1990) had earlier discussed the inconsistency of the skinfold thickness method. They investigated the relationship between skinfold thickness and densitometry on a sample of 378 boys and girls who were between 7-20 years old. They found that an error of 3-5% was made when body fat

percentage was estimated in pre-pubertal children using the skinfold thickness and they concluded that it was not a good method for estimating fat content in children. Further to this, skinfold thickness is limited by inter-observer bias since different measurements have to be taken using callipers (Kopelman, 2001). Additionally the method is criticised for measuring only the subcutaneous fat and not attempting to estimate the percentage of the visceral fat and the fat within other cavities; thus an estimate of the percentage body fat based on this method would not be accurate (Sarria *et al.,* 2001).

On the contrary, Sardinha *et al* (1999) have argued that skinfold thickness is the best method in defining obesity in children and youth and thus should be used in screening for obesity in individuals within these age groups. In their cross-sectional study on a sample of 165 and 163 Portuguese boys and girls aged 10-15 years, three methods were compared, namely BMI, skinfold thickness, and upper arm circumference. Using the clinical definition for defining obesity (≥ 25% body fat and ≥ 30% body fat in boys and girls respectively), they concluded that skinfold thickness was the best method in screening for obesity in children aged between 10-15 years.

2.2.3.2 Bioelectric impedance method

This method which was invented in the 1980s is used to estimate body composition (Kyle *et al.,* 2004). It is applied by directing a small harmless electrical current through the body of an individual (Kopelman, 2001). This electrical current would be conducted by the fat free body mass while it would receive resistance from the fat mass (Ellegard *et al.,* 2008). This resistance is called bioelectric impedance and it can be used to estimate the amount of fat body mass in an individual, using an equation that takes into consideration other anthropometric measures such as height, weight and sex (Ellegard *et al.,* 2008; Guo, *et al.,* 1989; Houtkooper *et al.,* 1989).

Schaefer *et al.* (1994) discussed the usefulness of the bioelectric impedance method in assessment of body composition in children. They argued that it is a very suitable method, especially for children, as it can easily be applied, with minimum cooperation from the child, yet it is non-invasive and inflicts no pain on the child. In their study about the validity of bioelectric impedance for body composition assessment in children, Houtkooper *et al* (1989) found that bioelectric impedance was a reliable method for estimating body fat, especially in children. Their findings

were later confirmed by Schaefer *et al* (1994) as being true, however they also noted that the method was largely affected by the fluid state of the individual's body and thus could potentially misinform about the amount of body fat of the individual.

No cut off points have been published for defining weight status in children using this method, therefore it is difficult to know at what percentage of body fat a child can be considered to be overweight, ideal weight or underweight. This method also seemingly requires technically trained personnel for use. It is therefore not a good method for screening or surveillance purposes especially at population levels. This method could, however, be useful in further investigating the weight status of children who have been identified as being at risk from screening exercises using other methods such as the BMI. Kopelman (2001) has argued that although this method seems technical, it is not superior to the other anthropometric methods for determining body composition such as the measurement of skinfold thickness discussed above.

2.2.4 Simple measurement methods for assessing body composition

These methods are not sophisticated and have been widely used in epidemiological studies to determine weight status and body composition among children. Wells and Fewtrell (2006) argued that, although simple techniques are known to be inaccurate in estimating body composition, they should not be discarded because they offer many advantages such as being easy, quick and simple to use; and they provide instant information regarding body composition of individuals. Simple measurement methods include waist circumference measurement and body mass index (BMI).

2.2.4.1 Waist circumference method

This is a simple method used to estimate localised central fatness. McCarthy *et al* (2003) argued that the distribution of fat mass in the body is more predictive of ill health compared to total fat. This has been reiterated by Saelens (2008) in a recent study. Wells and Fewtrell (2006) have indicated that fat distribution is associated with diabetes, even in children. Fat distribution is therefore more likely to predict adverse health outcomes compared to total fat mass. Waist circumference is the simplest method used to investigate fat distribution. The accuracy of this method has been shown to be highly correlated with sophisticated techniques such as x-ray absoptiometry and magnetic resonance imaging. This was demonstrated by Daniels *et al* (2000). They studied distribution of body fat among children aged between 7-17 years old using simple techniques and comparing them with the

complex x-ray absorptiometry technique. They found that waist circumference was most strongly correlated with x-ray absorptiometry (with Pearson's correlation coefficient, r = 0.8).

2.2.4.2 Body Mass Index (BMI) method

BMI (also called the Quetelet's index) is defined as the ratio of the individual's body weight in kilograms to the square of his/her height in metres (Garrow and Summerbell, 1995; Flegal *et al.,* 2006). It was first developed by Adolphe Quetelet in the 18th Century and was primarily used to monitor trends of weight status in populations (Hall and Cole, 2006). It gained popularity in the 19th Century as obesity began to take its toll on increasingly sedentary societies (WHO, 1995). To date, BMI is the most common method used in epidemiological studies to estimate weight status of individuals (Boutelle *et al.,* 2004).

It is important to note that BMI does not provide a direct measure of adiposity; it provides an estimated proxy for adiposity. It is based on the assumption that individuals (by gender) of the same height would normally have the same weight and therefore any differences would primarily be due to fat mass (Kopelman, 2001). In this way BMI provides only an estimate of the body fat of an individual (Campbell and Haslam, 2005). BMI has been reported by Kopelman (2001) to be highly correlated with other more accurate measures of adiposity such as the multi-component and two-component techniques. This, together with the ease with which it can be applied, explains why it has been internationally accepted as the gold standard for determining weight status in both adults and children (Campbell and Haslam, 2005; Garrow and Summerbell, 1995; Kopelman, 2001; Flegal *et al.,* 2006; WHO, 1995).

The ideal range of BMI in children tends to vary significantly with age and sex thus various reference data sets specific to age and sex have been developed so that a child's BMI can be compared with the reference population within the same age group and of the same sex (Flegal *et al.,* 2006). BMI reference data sets have been used for monitoring the growth of children and defining child weight status in many regions since they are developed from a population thought to be representative of the region (Cole *et al.,* 1998; Flegal *et al.,* 2006; Mast *et al.,* 2002; Rolland *et al.,* 1991). Classic examples include the data set developed in the UK in 1990 from surveys in England, Wales and Scotland (Cole *et al.,* 1998; Flegal *et al.,* 2006), the growth charts developed in 2000 by the Centres for Disease Control and Prevention

(CDC) in the US (Kuczmarski *et al.,* 2000) and the BMI-for-age charts developed by the WHO (de Onis *et al.,* 2004; Onis *et al.,* 2007). These are specifically developed for monitoring growth of children (Flegal *et al.,* 2006).

For determining weight status of children, the WHO (1995) recommended use of the reference data set which was developed from the first USA National Health and Nutrition Examination Survey (NHANES - I) during the 1970s, since it has sex and age-specific percentiles for defining weight status in children. But for many years, the universal use of this data set has been liable to challenges; many have posited that it would not be practical to use a data set developed in one population with widely different growth conditions as a reference for another population elsewhere having very different conditions (Cole *et al.,* 2000). In particular, the USA children used to develop this data set are considered to be relatively well nourished compared to other countries. This means that the growth rates of children in America are more likely to be different from children elsewhere in the world, suggesting that it would not be plausible to use the data sets developed from America as references for all children worldwide.

In 2000 it became apparent that there was need for an international data set with cut off points that could be used for defining weight status in children rather than using only the US based data set in different countries. Consequently Cole *et al* (2000) developed a set of BMI values with cut offs specific to age and sex from national data sets from six countries namely: Netherlands, Brazil, UK, Hong Kong, Singapore, and the USA. These cut offs are commonly known as the International Obesity Task force (IOTF) cut offs for defining weight status in children (Flegal *et al.,* 2006). Table 2.1 identifies the cut off points in terms of percentiles that have been agreed for defining weight status in children (Cole *et al.,* 2000; Cole *et al.,* 2007; Jotangia *et al.,* 2005; National Child Measurement Programme - NCMP, 2008; Maynard *et al.,* 2003).

Table 2.1 Showing the cut off percentiles for defining weight status in children

Weight status of the child	Cut offs for monitoring and surveillance purposes	Cut offs for clinical practice
Overweight/Obese	≥ 95th Percentile	≥ 98th Percentile
At risk for Overweight	≥ 85th and < 95th Percentiles	≥ 91st and < 98th Percentiles
Ideal weight	>5th and < 85th Percentiles	>2nd and < 91st Percentiles
Underweight	≤ 5th Percentile	≤ 2nd Percentile

Although the development of international cut off points was a step closer to the solution of a universal definition of child weight status, it could not solve the dilemma associated with the meaning attached to weight status worldwide. For instance, Flegal *et al* (2006) discussed the wide variation in the terms used to define weight status in children from one country to the other and from one study to the other. Campbell and Haslam (2005) had earlier noted that in countries like the USA identifying children as obese had affected their ability to participate in programmes aimed at managing their weight, consequently terms like 'very overweight' to mean obese have been used and other categories such as 'at risk of overweight' have been developed. While in some regions these terms have been accepted, they have been rejected in others. This has potentially hampered the ability of public health scientists to derive a universal definition regarding child weight status. In light of this dilemma, the key question to address here is whether there is need for a universal data set for use as a reference for all populations. The answer to this question is a subject for debate, but literature indicates that several studies have identified severe disagreement in the classification of weight status of children when several different reference data sets are used on the same population of children (Al-sendi *et al.,* 2003; Flegal *et al.,* 2006; Kain *et al.,* 2002; Wang and Wang, 2002). For instance, in one study three reference data sets namely: CDC, IOTF and Must data sets when used to determine the prevalence of overweight among children each gave different estimates (Flegal *et al.,* 2006). This poses a real dilemma in defining weight status in children. It is quite likely that children may be misclassified and this poses a real danger of encouraging nutritional restriction for those misclassified as overweight when they are in fact ideal weight, or failure to instigate early intervention for those misclassified as having an ideal weight when they are in fact overweight.

Although several authors have highlighted the importance and superiority of BMI in defining weight status of children (Campbell and Haslam, 2005; Flegal *et al.,* 2006; Kopelman, 2001; Reilly, 2007), there remains the problem that it does not differentiate fat mass from lean mass (Kopelman, 2001). It is therefore quite possible that a person can have a high BMI value, yet might still have a very small fat content, as in the case of heavily muscled people like body builders and athletes (Campbell and Haslam, 2005), yet BMI would continue to classify them as obese. Flegal *et al* (2006) have therefore argued that weight status of individuals based on BMI cut off points should only be used for population surveillance and monitoring and not for diagnosing physiological states. For children, the BMI method should be

used for screening and population level surveillance, but those found to be at risk should then be given more examination to determine their actual fat mass using other specific techniques discussed in the sections above. BMI is also limited by ethnic background of individuals (Shaw *et al.,* 2008). Among children, the value of BMI corresponding to an increase in the risk of ill health is unclear (Sweeting, 2007).

Despite its acknowledged problems as a measure, BMI emerges as the preferred method for defining weight status in children, at least at population level (Reilly, 2007; The NHS Information Centre, 2010). Of particular importance among the classes of weight status in children is obese/overweight. Childhood obesity is an important aspect as far as child health is concerned, as the sections in this review describe. Although the available methods for defining weight status in children (described in sections above) have been criticised for being subjective, they have been used to define childhood obesity and this has enhanced the understanding of the epidemiology of childhood obesity discussed in the next section.

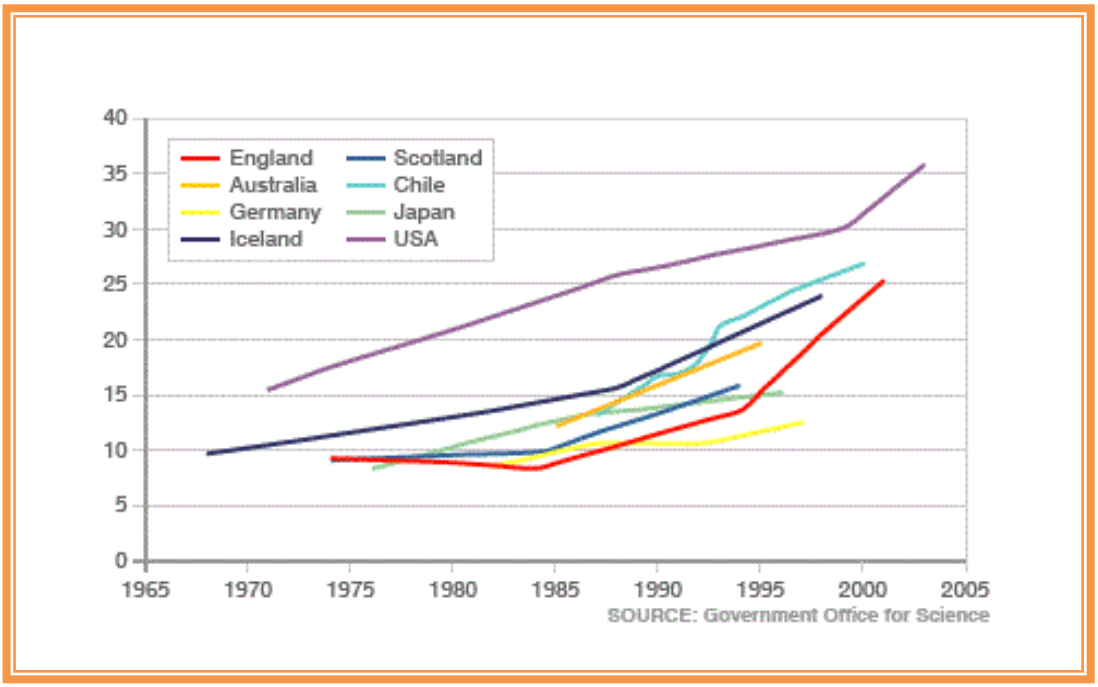
2.3 Epidemiology of childhood obesity

2.3.1 International prevalence

Worldwide there has been a rapid increase in the prevalence of childhood obesity (Lissner *et al.,* 2010; Musaiger, 2011; National Obesity Observatory, 2011; Olds *et al.,* 2009; Stamatakis *et al.,* 2010). The WHO has recognised childhood obesity as a global challenge in public health (Lioret *et al.,* 2009; WHO, 2009). By 2004, Lobstein and colleagues reported that over 30-45 million children of school-going age (5-17 years old) worldwide were obese and some 155 million children in this age bracket were overweight. Among pre-school children the worldwide prevalence of overweight was estimated at 22 million. Europe was shown to be home to some 3 million children who are obese and 14 million who are overweight (Lobstein *et al.,* 2004).

Over the three decades between 1970 and 2000, there was a two to three fold increase in childhood obesity in many countries in Europe, Asia and the USA (Lobstein and Jackson-Leach, 2007). Predictions indicated that by 2010, almost half of the children in the USA would be obese and overweight; over 1 in 3 children in Europe would be obese and overweight, whereas 1 in 5 children in Asia would be obese and overweight (Han *et al.,* 2010). Figure 2.1 shows the trend of increase in childhood obesity in selected countries between 1970 and 2000.

Figure 2.1 Trends in childhood obesity in selected countries in the world (adapted from Lobstein and Jackson-Leach (2007, pg4).



The National Obesity Observatory (2011) has indicated that childhood obesity, which was originally thought of as a problem of developed countries, is now known to equally affect developing and transitional countries. In 2010, it was estimated that 42 million children aged below five years were overweight or obese and out of these, 35 million children were living in developing countries. Nevertheless, the USA is known to have the highest prevalence of childhood obesity worldwide and the UK has the highest prevalence of childhood obesity in Europe (National Obesity Observatory, 2011). Figures 2.2 and 2.3 indicate the prevalence of childhood obesity in selected countries in the world.

Figure 2.2 Prevalence of childhood obesity among boys in selected countries (adapted from the National Obesity Observatory, 2011).

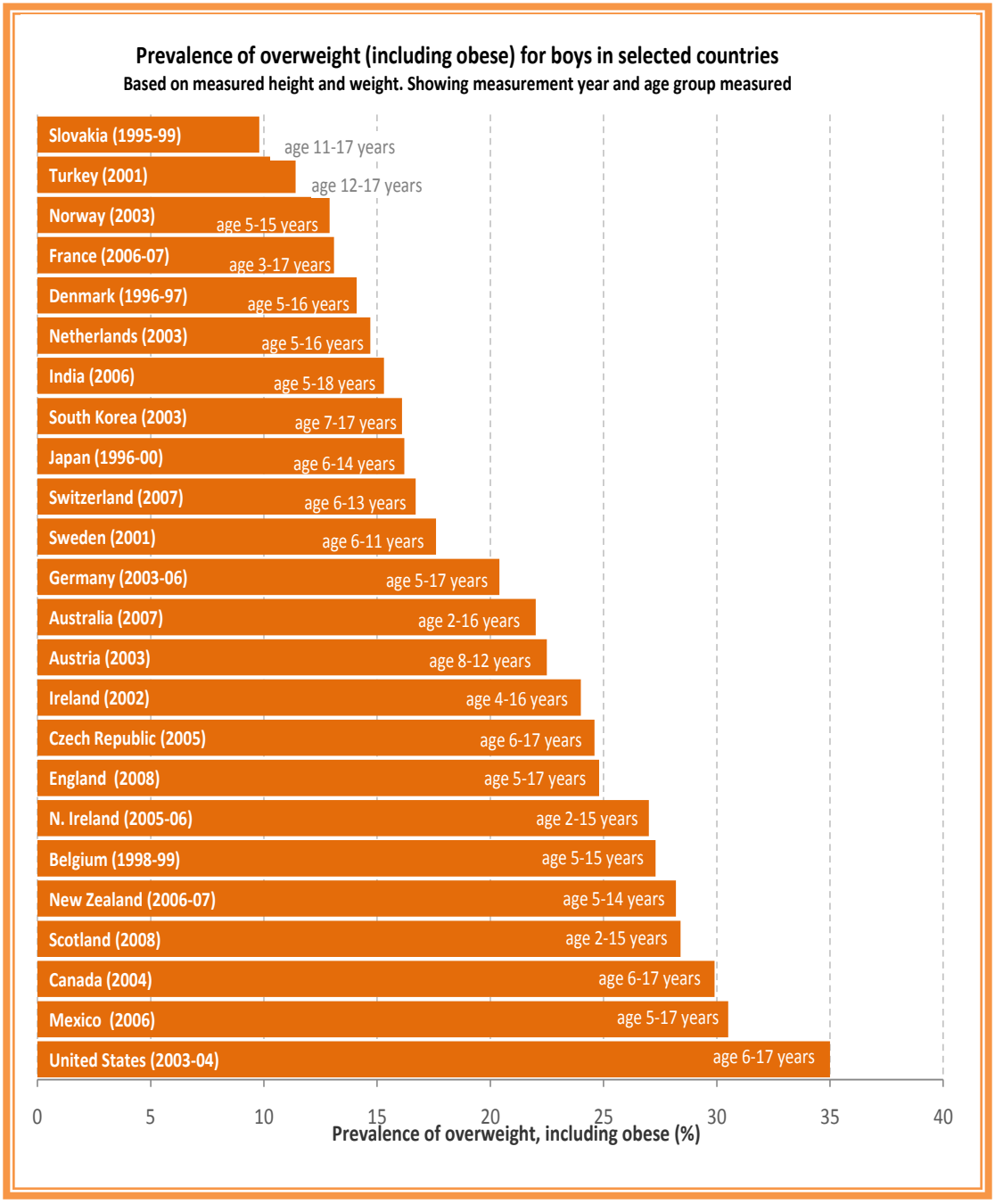
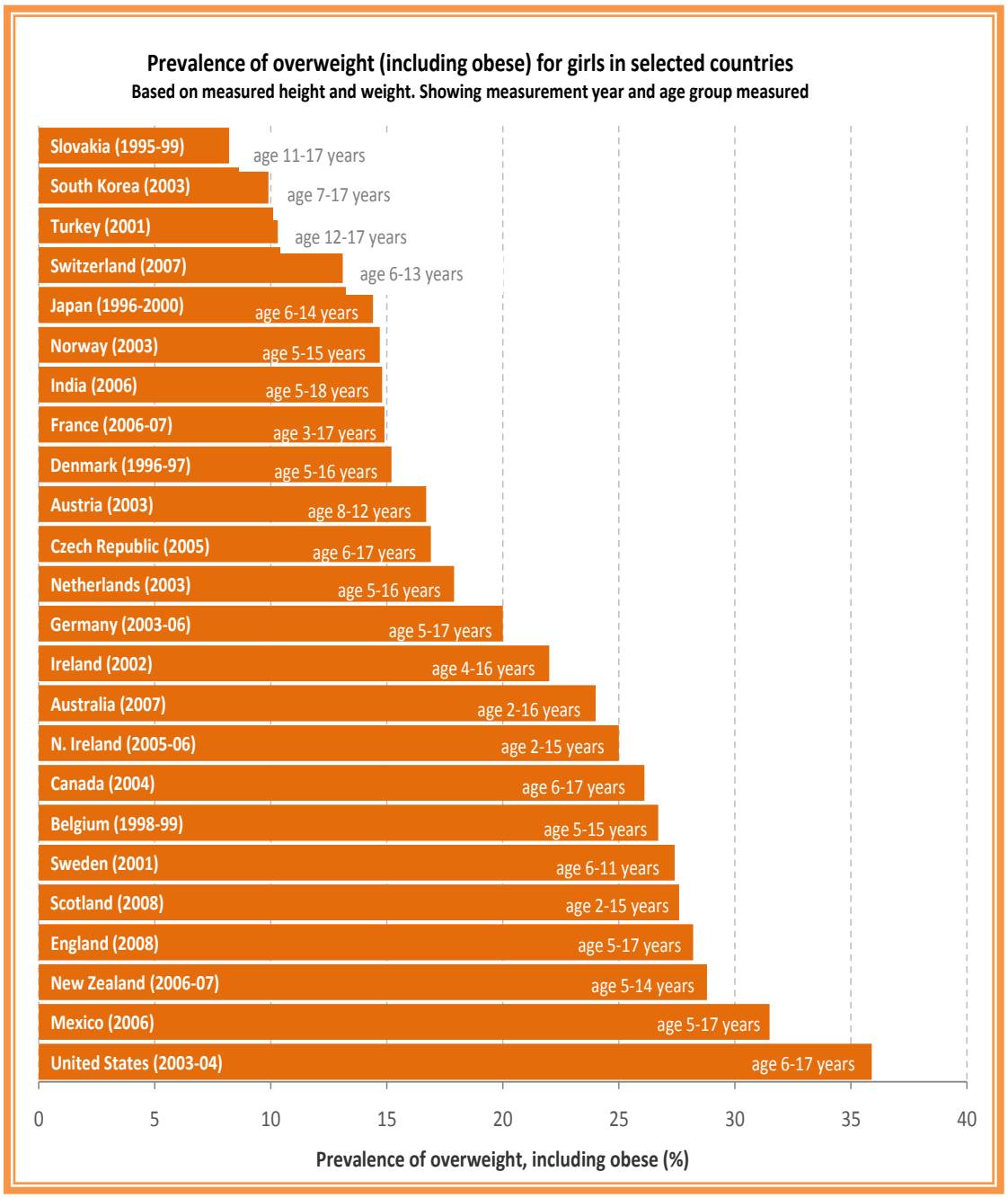


Figure 2.3 Prevalence of childhood obesity among girls in selected countries (adapted from the National Obesity Observatory, 2011).



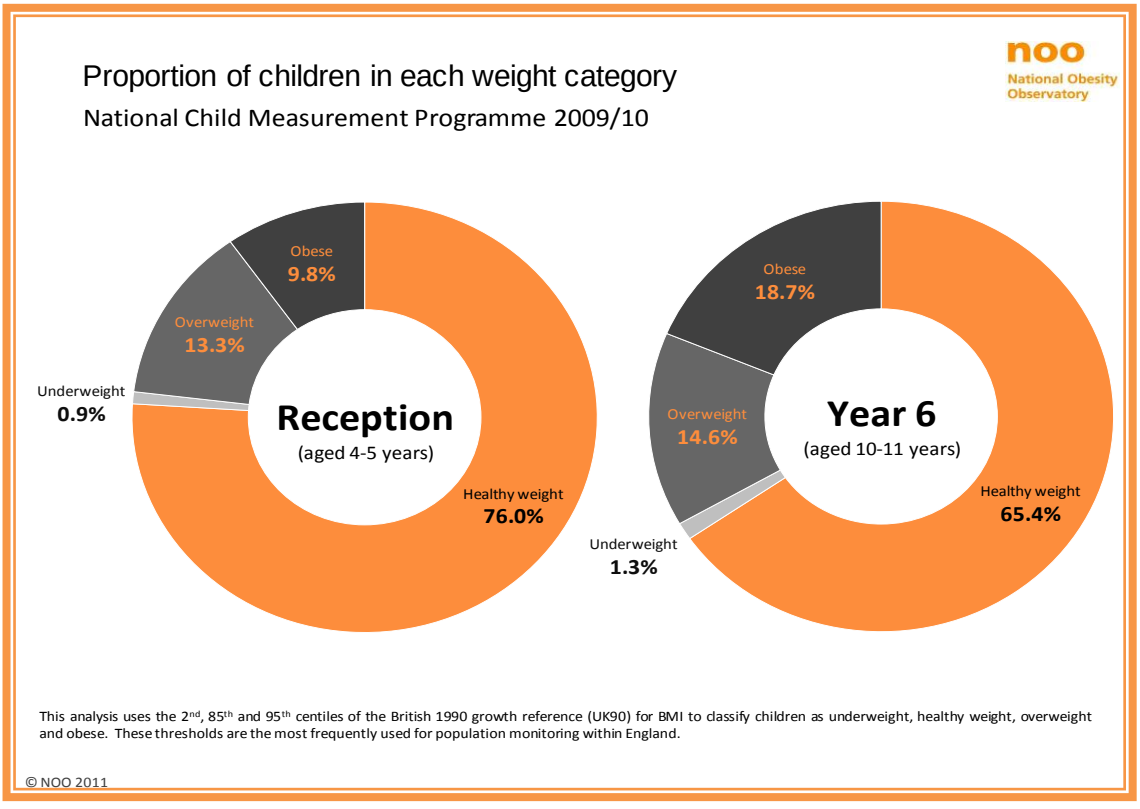
However studies in many countries have indicated that levels of obese and/or overweight children have become constant in the second half of the past decade (Flegal *et al.,* 2010; Lissner *et al.,* 2010; Stamatakis *et al.,* 2010). Olds *et al* (2009) reviewed forty-one studies carried out on childhood obesity in Australia over the past three decades. They observed that in the past 10 years, there had not been any significant increases in the percentages of obese or overweight children in Australia. Similarly, Ogden *et al* (2010) analysed data from the NHANES of the USA, over the

past decade. They observed no significant increase in high BMI among children between 1999 and 2008. Lioret *et al* (2009) analysed the trends in childhood overweight in France from 1999 to 2007 and found that overweight and obesity among children was stabilising. Similar trends were observed in England, as the next section will discuss.

2.3.2 National prevalence (United Kingdom)

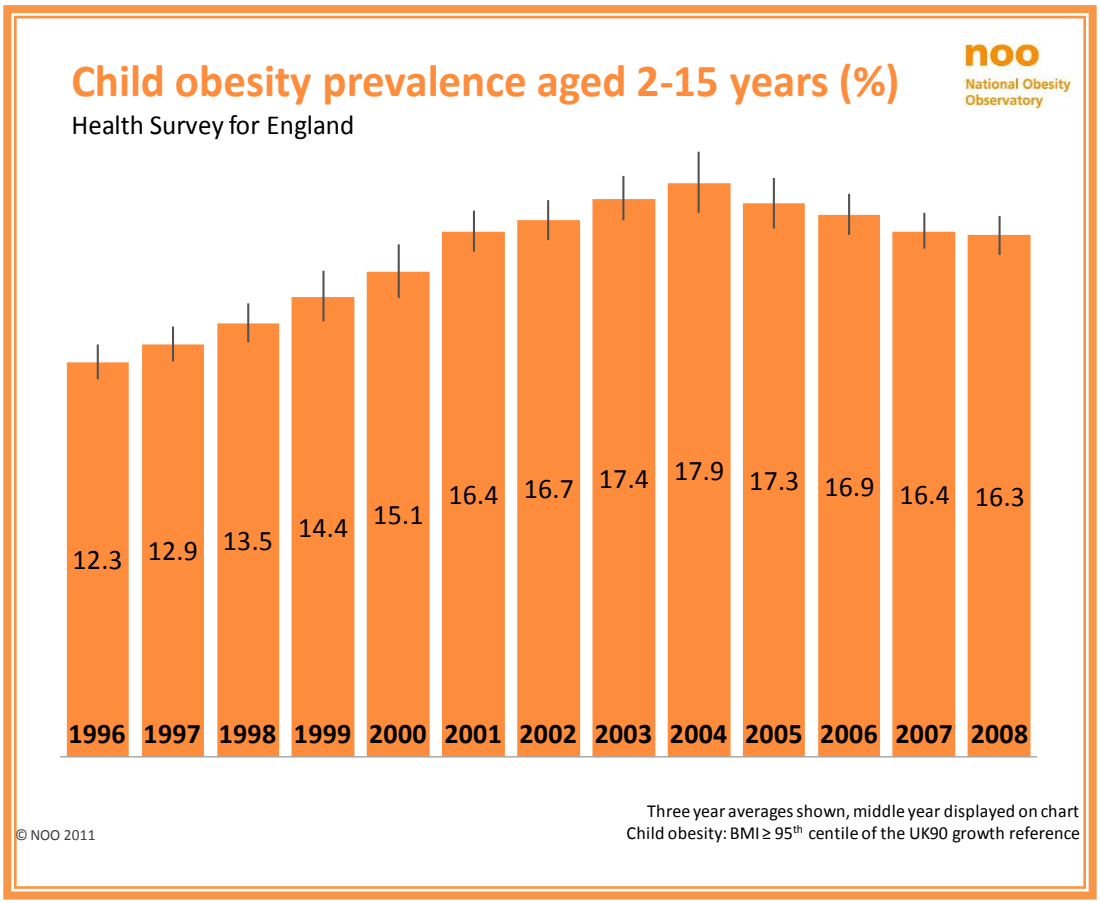
In the UK there has been a shift in the average weight of children towards overweight and obesity in the past few decades (WHO, 2008; Wilkinson *et al.,* 2007). By 2004, it was estimated that over 1 million children aged below 16 years were obese (Educari, 2004). As in other countries, the trend of this epidemic in the UK has shown a steady increase since 1984. By 2001 the prevalence of childhood obesity had reached 22% and 28% in boys and girls respectively (Chin and Rona, 2001). The Health Survey for England (HSE) (2008) and the NCMP (2009) provide the most recent information about the prevalence of childhood obesity in England. Analysis of data from the 2008 HSE has indicated that childhood obesity among children aged between 2 to 15 years old increased from 11.1% in 1995 to 16.8% in 2008. Childhood obesity prevalence from the data from the NCMP (2009 – 2010) is represented in Figure 2.4 below:

Figure 2.4 Prevalence of childhood obesity in England (adapted from the National Obesity Observatory, 2011).



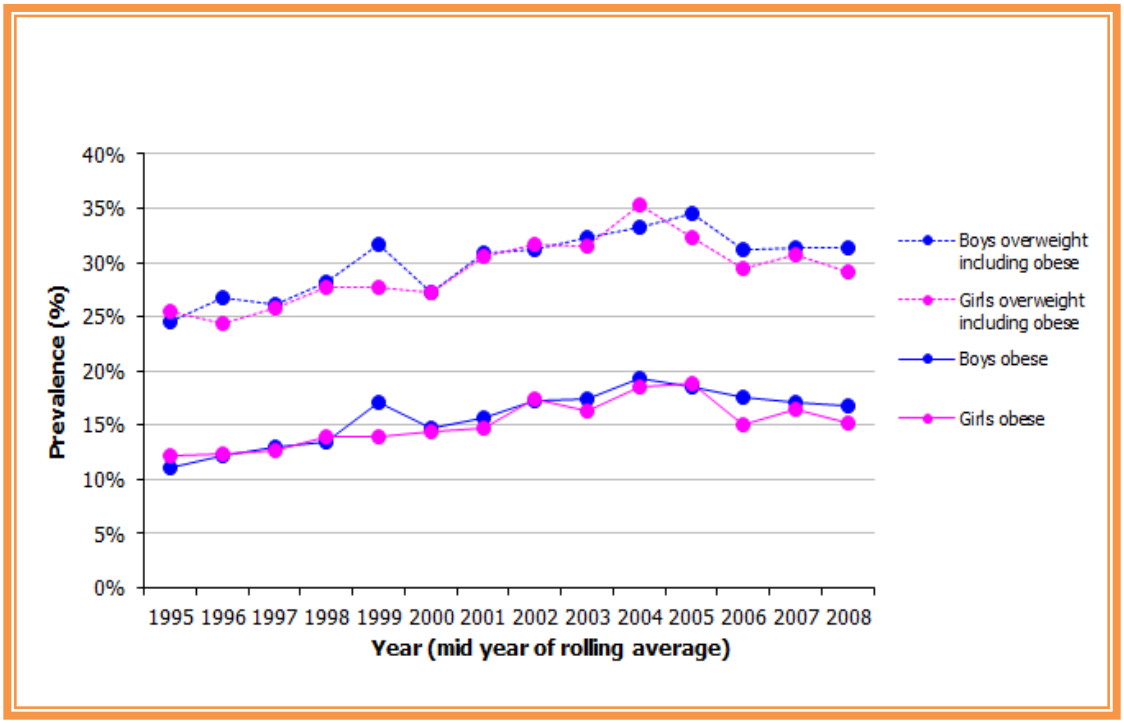
The prevalence of childhood obesity in England increased significantly from the mid 1990s to the mid 2000s; however the rate of increase seems to have slowed from 2005 on-wards (National Obesity Observatory, 2011). Figure 2.5 indicates the trends in the prevalence of childhood obesity in England over the past decade and a half.

Figure 2.5 Trends in childhood obesity in England (adapted from the National Obesity Observatory, 2011).



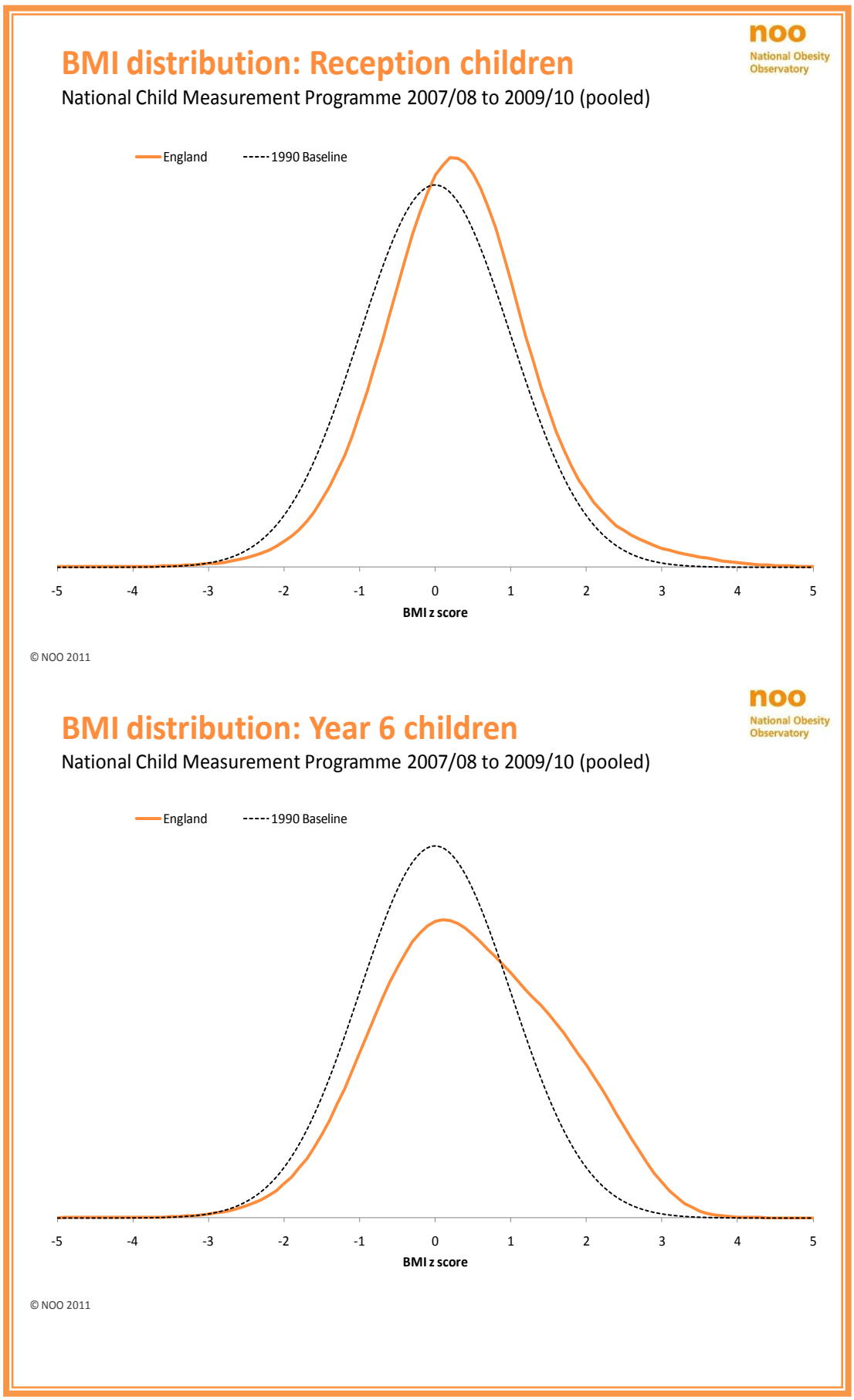
The trend observed in the figures above is similar for all the other countries that make up the UK namely Scotland, Northern Ireland and Wales (National Obesity Observatory, 2011). Of note, comparison between the NCMP data sets between 2007 and 2010 does not indicate significant differences in the prevalence rates of childhood obesity. Many researchers have argued that the prevalence of childhood obesity in England increased up to the early 2000s and that it has subsequently levelled off (Boddy *et al.,* 2010; Stamatakis *et al.,* 2010). The NHS Information Centre (2010) compared data from the Health Survey for England over the previous years and concluded that the prevalence of childhood obesity appears to have levelled off. Figure 2.6 below indicates the trends in childhood obesity up to 2008.

Figure 2.6 Overweight and obesity prevalence of children aged 2-15 years, 1995 – 2008 by age and sex (Adapted from Information Centre, 2010)



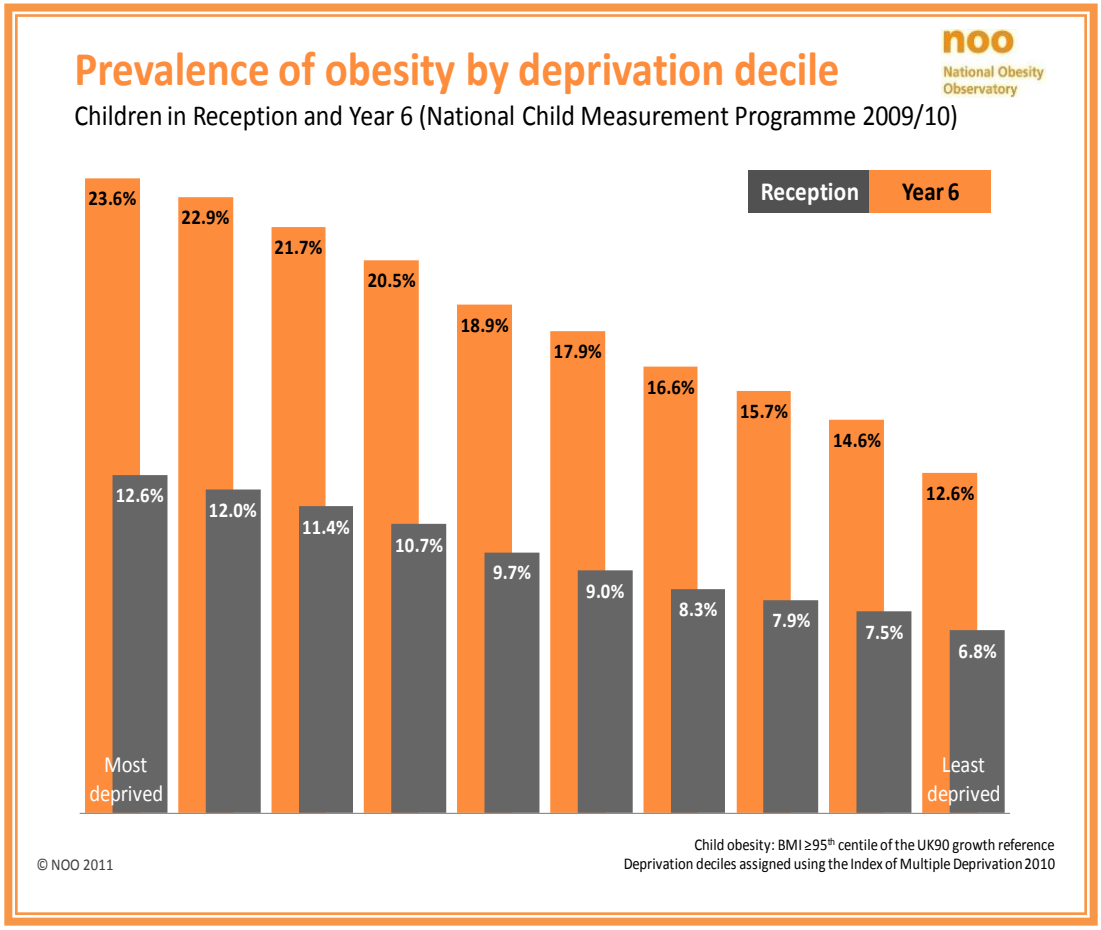
These trends are similar for Scotland and Wales (The NHS Information Centre, 2010). Although it appears that the rate of increase in childhood obesity has been reducing in recent times, it is important to note that the prevalence of childhood obesity is higher than it was in the early 1990s. Figure 2.7 demonstrates the shift in the distribution of childhood obesity between the early 1990s to date.

Figure 2.7 BMI distribution for reception and year six children between 1990 and 2010 (adapted from the National Obesity Observatory, 2011).



However, in order to understand more about this phenomenon, it may be important to look more closely at patterns of prevalence. Of particular note is the fact that the prevalence of childhood obesity varies with deprivation status. The National Obesity Observatory (2011) has indicated that childhood obesity levels increase with an increase in deprivation. Figure 2.8 indicates prevalence of childhood obesity by levels of deprivation.

Figure 2.8 Prevalence of childhood obesity by deprivation (adapted from the National Obesity Observatory, 2011).



2.3.3 Regional prevalence (North East of England)

The North East of England is one of the regions that is most severely affected by childhood obesity. In fact the rate of increase in the prevalence of obesity in this region has been shown to be higher than the national average. The analysis of data from the NCMP over the previous cycles of measurement has shown that the prevalence of childhood obesity both in reception and year six in the North East of England has consistently been higher than the national average, as Table 2.2 indicates.

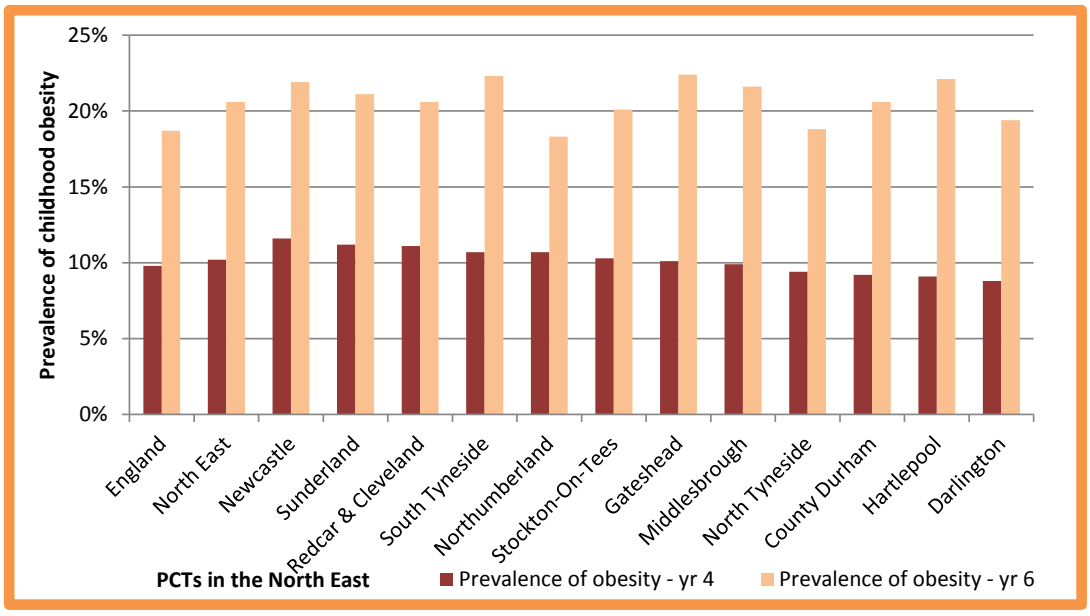
Table 2.2 Prevalence of childhood obesity in the North East of England compared to the national average (Information from Ells *et al.,* 2007, 2008, 2009, 2010).

NCMP cycle of measurement	Prevalence of obesity in reception (4-5 years old)		Prevalence of obesity in year six (10-11 years old)	
	North East	National average	North East	National average
2006/2007	10.9%	9.9%	19.9%	17.5%
2007/2008	10.7%	9.6%	20.8%	18.3%
2008/2009	10.3%	9.6%	20.4%	18.3%
2009/2010	10.2%	9.8%	20.6%	18.7%

Prevalence of childhood obesity among children aged 10 – 11 years old in the North East of England was the second highest in England in the most recent NCMP cycle -2009/2010 (Ells *et al.,* 2011). In line with the international and the national trends already discussed, it is worth noting that rates of childhood obesity in the reception year in the North East of England have been declining over the past years. Although childhood obesity among children in year six has shown increase over the same time period, it has only been a slow increase.

Rates of obesity among children differ in the different PCTs within the North East of England as Figure 2.9 indicates. This difference could reflect the percentages of populations living in differing deprivation categories. PCTs with most deprived populations seem to have higher rates of childhood obesity.

Figure 2.9 Prevalence rates of childhood obesity in 2010 in the different PCTs in the North East of England (Information adapted from Ells *et al.,* 2011).



Of all the PCTs within the North East of England, Gateshead had the highest prevalence of obesity (22.4%) in 2010 among children aged 10 – 11 years old (Ells *et al.,* 2011).

Although evidence suggests that childhood obesity is reducing, the prevalence of this condition is still high in both the developed and the developing countries (Stamatakis *et al.,* 2010; Luttikhuis *et al.,* 2009). The Foresight report (2007) argued that the development of childhood obesity is complex and is a matter of great economic importance. It is therefore important to understand the causes and origins of this condition especially among children. The section below describes what we know about the development of childhood obesity.

2.4 Development of childhood obesity

Whilst there is no single mechanism that exclusively explains the development of obesity in children (Ahmad *et al.,* 2010; Anderson and Butcher, 2006; Dehgan *et al.,* 2005; Kleiser *et al.,* 2009), it is generally agreed that childhood obesity largely results from an imbalance in energy intake and energy expenditure. If the rate at which energy is expended is lower than the rate at which it is taken in, then the unused energy is usually stored as excess adipose tissue, thus leading to excess weight gain (Campbell and Haslam, 2005; Reilly, 2007).

From a physiological point of view, human bodies store energy in adipose tissues, a factor which is important for growth and development, for survival during times of hunger or starvation, and for additional energy during strenuous exercises (Wabitsch, 2000). The size and amount of adipose tissue stored in the body is thought to be controlled by certain homeostatic mechanisms regulated by the central nervous system (Butland *et al.,* 2007; Rosenbaum and Leibel, 1998). These mechanisms maintain a balance between energy taken in and that expended. Any changes in these homeostatic regulatory mechanisms can lead to a positive energy balance which may lead to deposition of more adipose tissues and weight gain.

In attempting to understand the aetiology of childhood obesity, it is important to identify the likely factors that cause energy imbalance. Identifying these factors has been a subject of interest in obesity research over the past decades, involving numerous cross-sectional and longitudinal studies.

2.4.1 Energy intake and the development of childhood obesity

Anderson and Butcher (2006) reviewed studies that investigated the factors that have significantly altered children's energy intake, thereby causing an imbalance in energy. They reported that several cross-sectional studies identified fast foods as the major causes of higher energy intake. However Ebbeling *et al* (2004) had earlier suggested that eating fast foods alone could not be the underlying factor for weight gain among obese children; they argued that it had more to do with the inability of obese children to compensate for the increased energy intake as opposed to their leaner counter-parts. But a longitudinal study conducted by Thompson *et al* (2004) found that among 8 – 12 year old children, those who consumed fast foods more than twice a week at baseline had larger weight gains after three years. However Anderson and Butcher (2006) noted that this longitudinal study did not provide proof for a causal relationship between fast foods and weight gain. They suggested that certain factors which were not observed in this study could have been correlated with both fast food consumption and weight gain and may in fact have been the cause of the observed weight gain.

Other than fast foods, sweet soft drinks and juices have also been thought to increase energy intake among children (Anderson and Butcher, 2006). In their prospective study about the relationship between sweetened drinks and childhood obesity, Ludwig *et al* (2001) found a positive association between soft drink consumption and overweight, and this was attributed to the high calorific value of soft drinks. A later cluster randomised control trial by James *et al* (2004) found similar results. In contrast, studies investigating the association between fruit juice and childhood obesity have produced equivocal results (Anderson and Butcher, 2006). A longitudinal study about children's juice intake and growth by Skinner *et al* (2004) did not find any link between juice intake and overweight, although earlier cross-sectional studies by Dennison *et al* (1997) and Skinner *et al* (1999) had found a positive association between juice intake and childhood overweight. Welsh *et al* (2005) conducted a retrospective cohort study of 10,904 children aged 2 and 3 years to examine the association between sweet drink consumption and overweight at follow-up. They used data collected between January 1999 and December 2001 using the Harvard Service Food Frequency Questionnaire. They found that there was a positive but non-significant association between sweet drink consumption and development of overweight among the leaner children at baseline. Children who were overweight were more likely to become obese while those obese at baseline were more likely to remain obese. Similar findings were observed by Rajeshwari *et*

al (2005) using data collected using the 24-hr dietary recall method in the Bogalusa Heart Study conducted between 1973 and 1994. They concluded that although there was no linear relationship between sweetened-beverage consumption and BMI, more studies were needed to confirm these findings. Of note, most of these studies are just associational and do not establish causality. Owing to this limitation, the evidence from these studies should be treated with caution.

Anderson and Butcher (2006) reported yet another factor which is highly linked to the increase in energy intake, namely snacking. Snacks are usually energy dense, and thus they would be expected to increase energy intake, thereby increasing the risk of developing obesity. However, there is no unequivocal evidence that confirms an association between snacks and the risk of childhood obesity/overweight. Bandini *et al* (2003) in their cross-sectional study compared energy intake from snacks between obese and leaner adolescents. They demonstrated that the energy intake from snacks was not significantly different for the obese and non-obese adolescents and thus concluded that the source of energy imbalance for the obese adolescents was due to reasons other than snacking.

In a later longitudinal study, Phillips *et al* (2004) were able to confirm the results of Bandini *et al* (2003). They collected information from 8-12 year old girls every year for 10 years; they too did not find a relationship between snacking and BMI. Similarly, many of these studies are associational and do not establish causality, thus evidence from them should be treated with caution.

Although it might seem logical to assume that overweight and obesity in children would be strongly associated with an increase in energy intake, there seems to be little robust evidence to support this theory (Ahmad *et al.,* 2010; Dehgan *et al.,* 2005; Summerbell *et al.,* 2009). Longitudinal studies that have analysed population level time trends in childhood obesity and energy intake over the past decades have also not supported any relationship between the energy intake and body weight. Analysing time trends in energy intake from studies conducted between 1930 and 1978, Whitehead *et al* (1982) found that energy intake for infants and children was higher before the late 1950s. For girls in particular there was a gradual decrease in energy intake over this period. Similarly Nicklas *et al* (1993) were able to show that the total energy intake of children aged 10 years in the Bogalusa Heart Study remained constant between 1973 and 1988. The decreasing trend in energy intake among children is similar in other parts of the world. In Sweden, for instance,

Sunegardh *et al* (1986) studied dietary intake for children aged 8-12 years over the previous 10-15 years. They found that energy intake had reduced among the 8 year old boys and girls and the 12 year old girls. In France, Rolland Cachera *et al* (2000) studied French children aged 10 years in two studies that were separated by 17 years. They discovered that between 1978 and 1995, the mean daily energy intake for the children had decreased by 218 KJ. In England Gregory *et al* (1995) were able to show that the average daily energy intake of children aged 1.5 to 2.5 years actually decreased by 291 KJ between 1967 and 1993. Similar trends of falling self-reported energy intake over the past decades have been demonstrated among children in Finland, America and other western countries (Rasanen *et al.,* 1985; Schlicker *et al.,* 1994).

Thus rather surprisingly, there has been a significant increase in childhood obesity and overweight over a period when energy intake has actually been reducing. The significant question to raise here is: If energy intake is associated with childhood obesity why then hasn't childhood obesity been decreasing during the times when energy intake has been reducing? Moreover, studies have indicated that energy intake in obese children is not significantly higher than in the non-obese children; in some cases it can even be lower (Elliot *et al.,* 1989; Wilkinson *et al.,* 1977).

One plausible reason which might explain this phenomenon, could be that energy intake has always been estimated using dietary survey methods such as the 24-hour recall and the Food Frequency Questionnaires which have been widely criticised for their limitations such as under-reporting, especially by the obese participants (Rolland-Cachera and Bellisle, 2002; Waling and Larsson, 2009). There is also the possibility that parents and carers who help children complete their diet diaries are more aware of 'healthy eating' and are more likely to ensure that the child consumes a healthy diet during the reporting period, and/or under-reports 'unhealthy food' and over-reports 'healthy food'. It is therefore possible that energy intake has not been properly estimated in most of the studies, which makes it less likely to find statistical evidence for a positive relationship between energy intake and childhood obesity and overweight, if it truly exists. But Rolland-Cachera and Bellisle (2002) have pointed out that although there are inevitably some errors in reported energy intakes due to under reporting, there is such a degree of consistency in the results that have emerged from widely distributed studies undertaken over a long time period, that it does suggest that increased energy intake alone may not be the entire cause of childhood obesity and overweight.

If, from the available evidence, energy intake alone cannot explain the aetiology of childhood obesity, then it is of paramount importance to consider the other factor that contributes to the energy balance equation; the energy expenditure.

2.4.2 Energy expenditure and the development of childhood obesity

Energy expenditure occurs in three main ways namely: physical activity, dietary thermogenesis (the energy expended in digesting food), and Basal Metabolic Rate (BMR) which is the minimum energy required for body function (Anderson and Butcher, 2006). For both children and adults, BMR forms the largest part of Total Energy Expenditure (TEE); this is followed by physical activity and then dietary thermogenesis (Schutz and Maffeis, 2002). The WHO report of the consultation on obesity (1998) identified that in adults with sedentary lifestyles, BMR accounted for 60% of TEE, physical activity 30% of TEE while thermogenesis accounted for 10% of TEE. In children, there is also a fourth factor, which is growth.

At the beginning of the 20th century scientists showed that BMR was higher in the obese children compared to their leaner counterparts (Schutz and Maffeis, 2002). This had been identified in earlier studies by Elliot *et al* (1989), Epstein *et al* (1994), Maffeis *et al* (1996) and Molnar and Schutz (1997). Schutz and Maffeis (2002) have explained that the higher BMR among the obese children is mainly due to the larger amount of active tissue also called fat free mass (FFM) in their bodies.

Bandini *et al* (1990) studied body composition, BMR and TEE in 35 obese and 28 leaner adolescents aged between 12 and 18 years old using indirect calorimetry and doubly labelled water techniques. They found that BMR of obese teenagers was not lower than expected and therefore concluded that reduced TEE due to BMR was not the cause of obesity among these adolescents. Maffeis *et al* (1993) wanted to establish the effect of weight loss on BMR in the obese prepubertal children. Using FFM as the covariate to compare the obese and non-obese children, they were able to show that BMR did not differ between the obese and non-obese children. In later studies, Goran *et al* (1995) and Fontvieille *et al* (1993) compared BMR in children within populations at higher risk of obesity and the Caucasian children at low risk of obesity. They concluded that reduced BMR was not a predictor/risk factor for obesity development in children. These studies seem to have used robust methodologies indicating that their findings are reliable.

With no evidence that BMR affects obesity development in children, attention had to be shifted to the other components of TEE namely: dietary thermogenesis and physical activity. Studies that investigated dietary thermogenesis among the obese and non-obese children showed small though inconsistent decreases in dietary thermogenesis among the obese children compared to their leaner counterparts. To date, there is no evidence to suggest that dietary thermogenesis has an impact on the development of obesity among children (Levin, 2009; Schutz and Maffeis, 2002).

The lack of evidence for the effect of BMR and dietary thermogenesis on weight gain among children means that focus has to be directed towards physical activity (Anderson and Butcher, 2006). By any standards physical activity is the most variable part of TEE. This is because it largely depends on the lifestyles and behaviours of individual children (Schutz and Maffeis, 2002). Although difficult to define, physical activity can be categorised into structured and unstructured activities for children (Cliff *et al.,* 2009); and in adults it can be categorised into occupational work, household activities and leisure activities (Schutz and Maffeis, 2002). Within each of these categories, activities can be sedentary, moderate or vigorous and each of these requires a different amount of energy to execute. In the second half of the 20th century, scientists using cinematography techniques showed that the duration and intensity of physical activities among obese children were usually reduced (Bullen *et al.,* 1964). However it was difficult to establish whether the reduced level of physical activity observed among the obese children was the cause or the consequence of obesity among these children (Metcalf *et al.,* 2008; Schutz and Maffeis, 2002).

More recently with the discovery of the non-invasive doubly labelled water techniques, scientists can estimate the amount of energy expended during a given physical activity from the equation below:

TEE – BMR = Energy expended in the activity

(Assuming dietary thermogenesis is negligible)

Bandini *et al* (1990) and Maffeis *et al* (1996), using this technique, calculated energies expended for different activities among the obese and non-obese children and they concluded that the amount of energy expended in a given activity largely depends on body size of an individual. Consequently obese children expend more energy to perform a particular activity compared to their leaner counterparts. This probably explains why even with more sedentary behaviour displayed by the obese

children, they have comparable total energy expenditures with their leaner counterparts who show higher levels of physical activity (Schutz and Maffeis, 2002). In light of this Schutz *et al* (2001) suggested that in assessing the day-to-day physical activity of children it is better to calculate the ratio of TEE to BMR which yields another variable called the Physical Activity Level (PAL).

TEE/BMR = Physical Activity Level (PAL)

Using PALs, Maffeis *et al* (1996) studied obese and leaner children aged 9 years old. They found that the PALs of obese children were higher than their leaner counterparts, although the difference was statistically insignificant.

More recently, Sallis *et al* (2003) reviewed evidence relating to physical activity among children and adolescents and concluded that studies investigating the association between physical activity and childhood obesity and overweight measured by BMI have produced mixed results. Anderson and Butcher (2006) explained this phenomenon as being due to the fact that BMI is not good at estimating adiposity, especially in the presence of significant fat free mass. This may be supported by Klein-Platat *et al* (2005) who found out that physical activity was significantly associated with smaller waist circumferences in both boys and girls. Overall, Berkey *et al* (2003) reported that longitudinal studies show an association between increased physical activity and lower BMI, suggesting that increasing physical activity can reduce childhood obesity and overweight. However the extent to which reduced TEE as a result of a decrease in PALs can lead to weight gain among children has not been clearly demonstrated.

The scientific evidence is thus curiously inconclusive regarding both PALs and energy intake and their effect on the development of obesity among children (Schutz and Maffeis, 2002) though both are still generally held to be significant in the development of the condition. A number of factors in the environment in which children grow up in contemporary society have been associated with significant changes in physical activity levels and energy intake in children, and have thus been posited as contributing to the increase in childhood obesity. The term 'obesogenic environment' has been used to describe these more distal environmental factors, and it is to a discussion of these that we now turn.

2.4.3 The obesogenic environment and childhood obesity development

The term obesogenic environment has been defined in many complex ways, but in its simplest form it refers to the conditions that make it conducive for individuals to gain weight, while also making it difficult to lose weight (Schafer-Elinder and Jansson, 2009). In recent decades there has been an increase in the recognition of the role played by the environment in which people live in terms of exacerbating obesity (Huybrechts *et al.,* 2011). A number of factors including technological advancement, food processing and marketing have been identified as contributing to the obesogenic environment.

The first is technological advancement; this has led to the development of televisions, computers, computer games, videos and many others. Children spend a significant amount of time watching television, working on computers or playing video games on computers (Lee *et al.,* 2011). Obviously this has reduced the amount of time children do physical activities and has promoted sedentary lifestyles. Trends show a significant increase in the number of households possessing a television, in the number of televisions per households, in the numbers of children having televisions located in their bedrooms and in the number of hours children spend watching television. Roberts (1999) in the Kaiser Family Foundation report demonstrated that by 1970 only 35% of the households in America had more than one TV, while 6% of children in grade six owned a TV in their bedroom. Twenty nine years later, in 1999, over 88% of the households had more than one TV and 77% of children had a TV in their bedroom. These trends are the same in the UK although they vary with social economic status.

Dietz and Gortmaker (1985) examined two cross-sectional samples and one retrospective sample of children obtained from data collected in cycles II and III of the National Health Examination Survey in the USA to try to identify the relationship between TV viewing and prevalence of obesity. They observed significant relationships between time spent watching television and the prevalence of obesity; in fact there was a 2% increase in the prevalence of obesity for every hour spent viewing television per day among the 12-17 year old children. More recently, a study conducted by Jackson *et al* (2009) has indicated that children who watch TV for longer hours are more likely to have higher BMI and to exhibit lower physical activity levels. For every extra hour of TV viewing, there was an increase in weight by one kilogram. This study used a total sample of 89 healthy pre-school children, all from a Caucasian background. The participants were obtained through posting

advertisements in different locations. Measurements of body composition, energy expenditure and physical activity were done using sophisticated techniques such as the doubly labelled water technique, dual-energy X-ray absorptiometry and accelerometers. This study does not seem to have controlled for several confounding factors including deprivation status, ethnicity, and several socio-demographic factors. Also, parents were asked to complete a questionnaire about the children's lifestyles which investigated the amount of time children spent watching TV. This could have potential problems in the accuracy of the information for this important variable, yet no efforts were undertaken to triangulate this information. Although this study provides intriguing findings, it is reasonable to treat them with caution.

Klesges *et al* (1991) in their study about parental influence on food selection concluded that watching TV was associated with reduced metabolic rates. However, since then these findings have not been repeated and other studies find no such effect (Anderson and Butcher, 2006). More recently Dennison and Edmunds (2008) having studied the available literature (not a systematic review) made a comment that evidence from cross-sectional, longitudinal and intervention studies indicates that television viewing is strongly associated with childhood obesity. They argue that through the television, 'junk foods'[1] are marketed with the particular target population being children. This modifies children's preferences, desires and portion sizes for these foods which subsequently leads to increased energy intake, yet with reduced physical activity levels, obviously leading to weight gain among the children. In addition, TV viewing may increase children's snacking behaviours, further increasing energy intake (Anderson and Butcher, 2006). Robinson (2001) reported that children aged 2 – 7 years in the USA spend an average of 2.5 hours per day watching TV, while the 8 – 18 year old children spend an average of 4.5 hours per day watching TV. These trends are similar to those in the UK, yet some commentators suggest that these observations may be an underestimation of the actual amount of time children spend watching television. For instance Dennison and Edmunds (2008) have remarked that most studies investigate child TV viewing by asking parents to mention the amount of time children spend watching TV. They suggest that parents rarely monitor their children watching TV and this leads to underestimation of the actual time children spend watching TV.

[1] Junk foods refer to foods that are high in energy but low in nutritional value.

It is worthy of note, however, that interventions to reduce the amount of time children spend watching TV are underway. Dennison and Edmunds (2008) have identified some of the interventions including efforts to raise awareness in the public about the benefits of reducing TV viewing hours for children, modification of the school curriculum to encourage children to reduce TV viewing hours, and reduction of snacking and eating while watching TV. A recent meta-analysis of these interventions by Maniccia *et al* (2011) has provided evidence that these interventions could significantly reduce the amount of time children spend watching television. Maniccia *et al* (2011) systematically searched databases and identified 29 robust intervention studies that were included in the meta-analysis. Their results indicated a small effect of these interventions on the time children spend on screen, although it was statistically significant. King and Hill (2008) have demonstrated that advertisement of 'junk foods' through other media such as magazines could also encourage unhealthy food choices among children.

Also as a result of technological advancement there has been a rapid proliferation of vehicles such as cars, motorbikes, etc. This has reduced people's desire to walk or cycle even for short distances; instead they use vehicles. Although they offer the advantage of being fast and comfortable, their major disadvantage is that of significantly reducing physical activity levels which is thought to be one of the reasons for the exacerbated levels of obesity among children and adults (Anderson and Butcher, 2006). Of note, this is not necessarily a matter of choice or laziness. Many towns in Western cities are now constructed such that car ownership is almost obligatory, since planning regulations have encouraged out of town shopping malls and retail 'shed' developments. Many large hospitals are now located on city outskirts, those buying food at city centre grocery stores are financially disadvantaged and only those with car ownership can take advantage of large supermarket shopping. These factors significantly contribute to the obesogenic environment largely thought to be causing an increase in the trends of childhood obesity.

Hu and Reuscher (2004) in their report on the 2001 National Household Travel Survey (NHTS) discussed the trends in household vehicle travel in the USA in the previous decades. They noted that daily household miles travelled by vehicle remained constant at about 32 between 1977 and 1983, but in 1990 they increased sharply to 41miles, in 1995 households generally travelled 57miles per day on average by vehicle. These trends are similar in other parts of the world, including

the UK. Anderson and Butcher (2006) have noted that the increase in miles travelled by vehicle per household could be due to the fact that children are no longer left to walk or cycle, especially when they are going to school. Comparison studies have shown that only 9.9% of travel undertaken by children was in the form of walking or cycling in the mid-90s as compared to 15.8% in the late 70s (Corless and Ohland,1999). This has been attributed to a number of factors. While many children would be quite delighted to be let out on their own to walk or cycle to school, many parents are terrified to let their children operate independently. Consequently children are chaperoned from pillar to post because of fears about child safety, traffic accidents, paedophilia etc (Furedi, 2001). This is fully described in Section 2.4.5.

In 2002 Russonello conducted a survey in the USA to investigate the attitudes of Americans toward walking and creating safe walking communities. He discovered that slightly more than half of the parents (53%) drove their children to school, slightly more than a third (38%) let their children take a bus to school, while only 17% and 5% reported their children walking and cycling to school respectively. The main reason that most parents gave for not letting their children walk to school was that schools were too far away (Russonello, 2003). Due to urbanisation, schools built more recently in USA are not within a short walking distance to the homes of children compared to those schools that were built many decades ago (Kouri, 1999). It was not only distance to school that hindered children walking or cycling to school in Russonello's survey, there were other significant reasons such as the lack of safe walking routes, fear of children being abducted, the environment being inconvenient for children to walk and so on (Russonello, 2003). On the whole less than 25% of children in America today walk or cycle to school compared to more than 60% many generations ago (Anderson and Butcher, 2006). In general these trends are not different among children in European countries or any industrialised country worldwide. This tendency has the potential to significantly reduce children's physical activity levels, thereby exacerbating the condition of childhood obesity.

Evidence for this was demonstrated by Cooper *et al* (2003). They studied the physical activity of 114 primary school children from five urban primary schools in Bristol, England for seven days as they travelled to school. They found that children who walked to school were significantly more active than those who were driven to school. Although no causal link was established; they concluded that walking to

school may significantly improve children's physical activity levels, especially in boys.

Of note, changes affecting physical activity levels of children have not only been seen in their travel to school but also in the entire environment in and out of schools. It appears that the curriculum in schools has increased time spent on academic subjects at the expense of physical activity; consequently children have less time for play. Even the increasing amounts of homework mean that children cannot find time at home to play. In 2002, Macpherson reported that there had been a 25% and 50% drop in play and outdoor activities respectively among children in USA since the 70s (Macpherson, 2002 quoted in Anderson and Butcher, 2006). Hofferth and Sandberg (2001) support this argument by suggesting that the increasing amount of homework children are required to do may be the cause of the falling trends in play and outdoor activities. Between 1981 and 1997 the overall time spent doing schoolwork by USA children increased by 20%, however for the 6-8 year old children it increased by 146%. These trends are not different from those in the other developed countries including the UK.

Although a lot of emphasis up to this point has been put on factors that directly lead to a reduction in physical activity within the children's environment, there are many other factors that are part of the obesogenic environment which may indirectly affect physical activity of children thus increasing the risk of obesity development among children. One such important factor is socio-economic status, which is described in the following sub-section.

2.4.4 Socio-economic status and childhood obesity development

Studies that have investigated the association between socio-economic status and childhood obesity have produced equivocal findings. Hill and Lissau (2002) have argued that the relationship between socio-economic status and childhood obesity has always been a contentious issue. The earliest review of 144 studies conducted by Sobal and Stunkard in 1989 found significant inconsistences in the relationship between socio-economic status and childhood obesity. The highest percentage of studies (38%) did not find any association; just over a quarter of the studies (26%) found a direct relationship, while 36% of the studies found an inverse relationship (Sobal and Stunkard, 1989). However Hill and Lissau (2002) pointed out that the lack of robust longitudinal studies in this review highlighted its weakness.

In 1999, Parsons and colleagues, in an attempt to update Sobal and Stunkard's review (1989), conducted a robust review of literature involving searching most scientific electronic databases. They found that most studies did not identify a clear relationship between socio-economic status in early life and childhood obesity; however, they reported a very clear association between low socio-economic status in early life and obesity in adulthood (Parsons *et al.,* 1999).

Wang (2001) analysed data sets for children aged between 6-18 years in different countries, and found that socio-economic status was inversely proportional to the prevalence of childhood obesity in developed countries, whereas it was directly proportional to the prevalence of childhood obesity in developing countries. He concluded that in most developed countries, obesity tends to be high in areas of high deprivation and poverty, whereas the reverse is true for most developing countries.

In a recent systematic review, Shrewsbury and Wardle (2008) studied 45 cross sectional studies from developed countries searched from PubMed database. They found that most studies (42%) indicated an inverse relationship between socio-economic status and prevalence of childhood obesity, with 27% of the studies showing no association at all, while 31% of the studies showed mixed results. However, the fact that in this review only PubMed database was searched creates doubt whether some of the vital studies published in other databases were not missed.

Lioret *et al* (2009) analysing the data from children in a cross sectional survey conducted by the French Food Safety Agency found a negative correlation between socio-economic status and childhood overweight and obesity. They reported that this correlation became stronger when socio-economic status was determined by parental education levels. They argued that parental educational levels could be a key factor in explaining the impact of socio-economic status on childhood obesity; as this is likely to impact on the knowledge of healthy lifestyles including healthy eating and levels of physical activity which are major factors as far as weight gain is concerned.

Other authors have supported the argument that socio-economic status has a direct link to healthy behaviours. For instance Ball and Crawford (2007) argued that individuals in less deprived families were more likely to engage in structured

activities like sport compared to those in more deprived ones. Likewise De Irala-Estevez and Groth (2000) demonstrated that less deprived individuals were more likely to have better eating habits (for example consumption of fruit and vegetables) compared to their highly deprived counterparts. These studies however, reported findings for individuals aged above 18 years. It is not clear whether or not these trends are similar among children. What is clear is that these simplistic associations do little in providing us with insightful explanations of the complex nature of factors underlying socio-economic status in relation to weight gain. It is arguable that less deprived individuals eat more fruit and vegetables just because they can afford to buy them and there is nothing intrinsically peculiar about their behaviours and lifestyles. More studies need to be conducted to facilitate better understanding of the association between socio-economic status and weight gain.

Parental employment is another socio-economic factor which could indirectly influence weight gain. Studies have indicated changing family employment structure to have an impact on the development of childhood obesity (Anderson *et al.,* 2003; Hawkins *et al.,* 2007). In households where both parents are in employment, there is a higher preference for fast foods because of the convenience. A study by Anderson *et al* (2003) using the mother and child data from the National Longitudinal Survey of Youth (NLYS) found that children whose mothers worked longer hours per week were more likely to be overweight. They explained that spending more time at work reduces the mothers' ability to prepare healthy meals for their child, thereby leading to consumption of 'junk foods', which may lead to obesity development. A study by Hawkins *et al* (2007) in the UK also found a significant relationship between mothers' hours of work and childhood obesity; in fact they concluded that mothers working long hours could particularly affect children's ability to access healthier foods and exercise. Moreover, having both parents working may prompt the parents to opt for driving their children to and from schools when they are going to work or coming back. This has the potential to reduce children's physical activity, thereby leading to weight gain. In contrast, a study by Moe *et al* (1995) did not find any relationship between mothers' employment and children's diet quality.

2.4.5 Parenting, child safety and childhood obesity

There is a growing body of research relating childhood obesity and overweight to the style of parenting (Berge *et al.,* 2010). Earlier studies by Kremers *et al* (2003) identified a significant association between parenting style and fruit intake among adolescents. In theory, parenting can be categorised into four major styles namely:

authoritative parenting style, authoritarian parenting style, permissive parenting style and neglectful parenting style (Maccoby, 2001). Authoritative parenting encourages children to develop self-regulatory skills, self-control and a high level of individual responsibility. Authoritarian parenting involves exerting regulation on the children by the parents, but allowing them to develop high levels of self-control and responsibility. Permissive parenting involves allowing children to be highly self-regulatory but with low levels of self-control and individual responsibility. Neglectful parenting involves a very low degree of encouraging self-regulatory skills, self-control and individual responsibility among children (Maccoby, 2001).

Berge *et al* (2010) conducted a study to identify whether or not parenting style predicted adolescent weight and weight related behaviours. They analysed data collected from 2,516 adolescents in Minnesota over a five year period. They identified that maternal authoritative parenting was predictive of low BMI among children. A recent systematic review conducted by Sleddens *et al* (2011) involving 36 high quality studies has indicated that there is evidence to suggest that children whose parents practice authoritative parenting are more likely to eat healthily, have a low BMI and high physical activity levels. Taylor *et al* (2011) have recently investigated the association between weight status of children aged four to five years and parenting styles in Australia. They have identified parenting style of fathers to be significantly associated with overweight and obesity among the children.

The changing perceptions of child safety among parents in developed societies have also had an impact on the parenting styles practiced by parents. Evidence suggests that the perceived level of danger to children has increased among parents and this has resulted in an increasing number of parents encouraging their children to play indoors (on computer games) instead of playing outside on streets (Furedi, 2001; Valentine, 1997). Hillman *et al* (1990) studied trends in parental behaviours over the previous two decades. They reported that the percentage of children allowed to travel to school by themselves had fallen from 80% in the early 70s, to 9% in 1990. Wyness (1994) and Dixey (1999) observed that the increasing perception of threats to child safety (from traffic, sexual predators and so on) has inadvertently led parents to react by increasing monitoring and supervision, while restricting the independence of children. The immediate impact of these changing trends in parenting is to reduce physical activity levels among children, which may inadvertently exacerbate childhood obesity.

That said, it is important to acknowledge that debates are ongoing regarding the likelihood of the increased danger facing children today compared to many decades ago. Many commentators have argued that the increase in the perceived danger facing children in the contemporary society is a mere 'moral panic[2]' rather than a real one. Statistics show that crime against children hasn't been increasing over the past decades; it is actually less common than it was many years ago (Finkelhor *et al.,* 2010). However media coverage is currently high and this is in part due to technological advancement. When a crime is committed it gets well reported and sometimes over exaggerated. On the other hand, parents seem to view the issue of child safety as a real one. Dixey (1999) qualitatively studied 32 mothers living in Swarcliffe, a relatively deprived estate on the outskirts of Leeds. She found that parents were preoccupied with the high risk of children getting abducted or run over by moving vehicles. She argued that this perception continues to change parenting behaviours and norms of good parenting.

Although there is evidence for the link between parental concern and child weight status (Schwartz and Puhl, 2003), literature indicates that many studies conducted have produced equivocal results regarding the perceptions of parents/guardians about the weight status of their children. Recently, Mooney *et al* (2010) in their study about the early experiences of routine feedback to parents, have reported that most parents whose children were indicated to be overweight or obese were initially shocked because they could not recognise overweight and obesity in their children. Also, Vanhala *et al* (2011) have studied 125 overweight children in Northern Finland beginning school. They have found that over half of the parents of these overweight children considered them to be of ideal weight.

Conversely, in their study about mothers' perceptions of their adolescent's weight status, Boutelle *et al* (2004) found that most mothers could accurately estimate their child's weight status and concluded that mothers do not need to be told their children's weight status, but that information to parents should focus more on healthy lifestyles and proper weight management. Literature also indicates that most parents are usually not concerned about their child's weight status as long as the child is happy, active and plays; they only get bothered when their children are unhappy or when they get teased (Shucksmith *et al.,* 2009).

[2] Moral panic refers to the delusional feeling that develops within a population that something could threaten survival of the society (Cohen, 1972).

Most recently, Jones *et al* (2011) have analysed the perceptions of parents regarding child weight status in the Gateshead Millenium Study (GMS) and have reported that parents cannot recognise overweight and obesity in their children, with 69.3% of parents with overweight or obese children reporting that their children are ideal weight. Kumanyika and Stettler (2001) discussed the shift in perceptions about the right size and weight in societies where obesity has become more prevalent. Crawford *et al* (2006) added that children who grow up in families where the parents, siblings and neighbouring friends are obese or overweight are likely to perceive being overweight as the ideal size.

2.4.6 Other factors related to childhood obesity development

Other determinants of childhood obesity include ethnic background and genetic disposition. Strauss and Pollack (2001) analysed data from the USA NLYS collected from 8270 children aged between 4 to 12 years old between 1986 and 1998. They observed that African-American children were more likely to be obese than the Hispanics and the non-Hispanic whites. These findings had earlier been discussed by Rosner *et al* (1998) in their study of US children aged 5 - 17 years old. In Europe studies have shown that children from different ethnic backgrounds may be at different risk of developing obesity (De Spiegelaere *et al.,* 1998; Roville-Sausse, 1999).

Overall no single cause can explain the aetiology of childhood obesity. Different mechanisms, which may be environmental, physiological or genetic, interlink to form a complex network of factors, each influencing weight status in different ways. Childhood obesity has far reaching implications on the child, the family and on society as a whole, as the next section will identify.

2.5 Consequences of childhood obesity

Studies have found evidence for long-term and short-term adverse effects of childhood obesity **directly** on the physical and mental health of a child both in childhood and in adulthood, and **indirectly** through exerting pressures on the dynamics of society such as impacting on the economy, social acceptability and so on. Researchers have predicted that in the wake of the increasing prevalence and severity of childhood obesity, not only will there be a significant reduction in the quality of life of those affected, but there is also potential for a considerable reduction in life expectancy (Daniels, 2009). Consequently future generations are

likely to live shorter lives compared to their parents. Systematic reviews of the direct consequences of childhood obesity have shown effects on both the physical and mental health of children (Lee, 2009).

2.5.1 Physical health consequences of childhood obesity

The most worrisome consequence of childhood obesity is its persistence even in adulthood (Bjorge *et al.,* 2008; Lee, 2009; Summerbell *et al.*, 2005). There are obesity-related conditions that only manifest later in adult life but which can trace their roots in childhood. Systematic reviews have been conducted to track the outcome of childhood obesity and overweight in adulthood. An earlier review by Reilly *et al* (2003) found evidence for obese and overweight children remaining obese and overweight in adulthood. Singh *et al* (2008) reviewed 18 longitudinal studies that investigated persistence of childhood obesity and overweight into adulthood. They found that the children who were obese and overweight were twice more likely to remain obese and overweight in adulthood.

However, it is important to note that some children who are obese or overweight can outgrow their condition and become ideal weight adults, yet also, some obese and overweight adults were not obese or overweight during childhood (Singh *et al.,* 2008; Whitaker *et al.,* 1997). On average, most studies that have tracked childhood obesity and overweight into adulthood, have shown evidence for the persistence of childhood obesity and overweight into adulthood (Reilly, 2003).

The risk of childhood obesity persisting into adulthood varies with different factors including child age (Singh *et al.,* 2008), socio-economic status (Hardy *et al.,* 2000) and genetic exposure (Whitaker *et al.,* 1997). The impact of childhood obesity on the physical health of children has been widely studied. There is evidence to suggest that obesity related diseases that were originally thought to affect obese adults are now known to affect obese children (Anderson and Butcher, 2006; Daniels, 2009; Srinivasan, 1996).

Rosner *et al* (2000) found evidence for the increased risk of high blood pressure associated with being overweight or obese among children. There is now evidence to suggest that children who become overweight or obese are more likely to develop high blood pressure when they become adults and this leads to cardiovascular complications (Daniels, 2006). Childhood obesity has been associated with the development of metabolic disorders. Klein *et al* (2004) identified the metabolic

disorders thought to be associated with childhood obesity as being: insulin resistance, metabolic syndrome, dyslipidemia, and type 2 diabetes mellitus. Steinberger *et al* (2001) studied 31 children aged 13 years old; they discovered that childhood obesity was strongly associated with reduced insulin sensitivity and subsequent increase in circulating insulin in blood both in childhood and in early adulthood.

Obesity and overweight in children have also been associated with increasing the risk of developing breathing complications such as asthma and obstructive sleep apnoea (Daniels, 2006; Luder *et al.,* 1998; Mallory *et al*., 1989). Nevertheless, establishing a causal link between obesity and asthma has been a subject for debate in the past decades. In general, asthmatic children usually have reduced physical activity which may itself promote obesity. It is not clear whether it is obesity that causes asthma or the reverse. But trends over the past decades have shown an increase in asthma among children in parallel with the increasing childhood obesity (Daniels, 2006). Childhood obesity has also been shown to be associated with orthopaedic complications among children (Daniels, 2006).

2.5.2 Mental health consequences of childhood obesity

Despite the severity of the potential physical adverse effects noted above, it has been postulated that psychological problems are the most immediate and obvious consequences of childhood obesity. In fact Hill and Lissau (2002) reported an increase in interest of the psychological implications of childhood obesity among researchers. While it is not difficult to establish causality between childhood obesity and physical symptoms, it is difficult to establish causality between childhood obesity and poor mental health. While the two might be associated, there are few indications of the direction of causality, i.e. whether obesity causes low self-esteem or low self-esteem encourages obesity is not known. A systematic review by Reilly *et al* (2003) showed that psychological problems were associated with childhood obesity. Obese children often had low self-esteem, were depressed, developed anxiety and many other psychological problems. However the evidence that supports this hypothesis is equivocal (Swartz and Puhl, 2003). French *et al* (1995) critically reviewed 35 studies that had investigated the relationship between self-esteem and obesity in children and adolescents. They found that out of 25 cross-sectional studies, 13 had shown a significant reduction in self-esteem among obese children and adolescents compared to their leaner counterparts. Likewise five of the six studies that had investigated body esteem had shown a significant reduction in

body esteem among the obese children and adolescents. But the two prospective studies that examined self-esteem at baseline and at a later time point produced contradictory results. It was also not clear whether weight loss was linked to self-esteem but six out of the eight intervention studies indicated that weight loss programmes had the potential to improve self-esteem. The authors also admitted that most of the studies were limited by methodological flaws, especially use of small sample sizes and lack of control groups.

Stradmeijer *et al* (2000) studied 73 overweight and 70 leaner young people aged 10 – 16 years old. They found that older overweight girls demonstrated lower body esteem while older overweight boys demonstrated higher body esteem. However earlier studies by Klesges *et al* (1991) did not find any differences in self-esteem between younger obese children and their leaner counterparts. But a study by Pierce and Wardle (1993) indicated that, as children grew older, lower self-esteem was associated with overweight and obesity among girls while for boys, lower self-esteem was associated with being too thin. This study also found a link between parental perceptions of the child's weight status with self-esteem. Children who felt their parents perceived their weight status negatively had lower self-esteem.

Childhood obesity has also been associated with depression among children (Swartz and Puhl, 2003). In a longitudinal study investigating body image, eating disturbances and depression among adolescent females, Stice *et al* (2000) were able to show a significant link between body dissatisfaction and depression. But other studies later identified that body dissatisfaction was caused by weight issues and it affected girls more than boys (Siegel, 2002). These two studies therefore provided insight into the process by which depression could develop among children who are obese and overweight. Due to excess weight gain, the body form changes leading to body dissatisfaction which in turn could lead to depression.

Wallace *et al* (1993) investigated whether obesity was a risk for depression in children. They reported that being overweight and obese among children was associated with a higher risk of developing depressive symptoms. In a later study, Erickson *et al* (2000) studied a sample of 868 children; they found that higher BMI was associated with increased depression. Most recent evidence points towards higher depression levels among overweight girls than their obese counterparts (Revah-Levy *et al.,* 2011). In a study involving 39,542 French adolescents aged 17 years, Revah-Levy *et al* (2011) have shown that the relationship between BMI and

depression is strongly significant ($p<0.001$). More interestingly, they have indicated that underweight adolescent girls are more likely to suffer from depression compared to their obese counterparts. They have further argued that the relationship between BMI and depression is non-linear, and they have suggested that in boys it could be U-shaped, whereas in girls it is complex with convex shapes being demonstrated as BMI gets higher, which indicates that being underweight is also associated with depression. This U-shaped relationship between obesity and depression has also been demonstrated by de Wit *et al* (2009) in adult populations. Recent systematic reviews and meta-analyses indicate that among adults, there is a significant association between obesity and depression (de Wit *et al.,* 2009; Luppino *et al.,* 2010). However among children and adolescents, evidence is equivocal, with some studies finding a relationship while others finding no relationship (Gaysina *et al.,* 2011).

However, amidst this debate, the key question that continues to generate debate is whether obesity causes depression or the reverse? Authors like Beydoun and Wang (2009) have suggested that it could be other factors such as socio-economic status that mediate the association between depression and obesity. Although their study provided evidence for this hypothesis among young adults aged 20 – 39 years, it is still not known whether or not this is true for children and adolescents. Moreover Wardle *et al* (2006) studied 4320 adolescents and did not find any relationship between obesity and depression. They reported that symptoms for depression were not significantly higher among obese children compared to their leaner counterparts regardless of their gender, ethnicity and socio-economic class.

However there is another body of research which suggests that it is depression instead that leads to obesity since it affects normal patterns of eating and physical activity. Goodman and Whitaker (2002) prospectively studied a cohort of 9374 adolescents; they discovered that depressed adolescents were at a higher risk of developing obesity. Blaine (2008) conducted a meta-analysis of 16 longitudinal studies to evaluate the causal relationship between depression and obesity. He found that individuals with depression were more likely to become obese and the difference was statistically significant. This study however considered studies published in only two databases (Medline and PsycINFO), it is quite likely that many relevant studies could have been left out of the analysis. That said, in general there hasn't been strong evidence for the causal link between obesity and depression; the

few studies conducted have been limited by small sample sizes thereby affecting the external validity of the results. More research is therefore needed to better understand the relationship between obesity and overweight and depression, especially in children and adolescents (Daniels, 2009).

Of particular importance, it has been indicated that overweight and obese children have difficulty in forming and maintaining stable socio-relationships with their peers. Strauss and Pollack (2003), in their study investigating social networks of overweight and normal-weight adolescents, found that overweight adolescents were normally socially isolated and marginalised. They were less likely to be nominated for a friend compared to their leaner counterparts (OR=1.71, 95%CI = 1.39 – 2.20). However these findings were contrary to those in the earlier study by Phillips and Hill (1998) who had found that overweight girls were as popular and with as many friends as their leaner counterparts.

Studies have also investigated the impact of childhood obesity on quality of life of children and adolescents. Some studies have shown that overweight and obese children often demonstrate lower quality of life compared to their leaner counterparts (Schwimmer *et al.,* 2003). But more research is still needed to uncover the precise mechanisms by which childhood obesity affects children's quality of life.

Puhl and Brownell (2001) discussed the stereotypes that are commonly associated with obese children. Societies hold the attitudes that obese children are: incompetent, lacking self-discipline, lazy and are psychologically unwell. Consequently obese children are discriminated against and stigmatised. Societal stigmatisation has attracted enormous attention among researchers and their interest is in establishing the extent to which obese children are targeted by societies for discrimination and stigmatisation (Schwartz and Puhl, 2003). The worst forms of stigmatisation for obese children include peer and adult rejection. Earlier studies by Richardson *et al* (1961) asked children to rank pictures of children with different physical disabilities in the order of those they would like most as friends. Of all pictures, it was the obese child that was ranked last. Recent studies by Cramer and Steinwert (1998) found that even the 3-5 year olds regard overweight children as less desirable for a friend compared to their leaner counterparts.

Wardle *et al* (1995) studied social variation in attitudes of children towards obesity. Children hold strong negative attitudes towards the obese, indeed obese children

were regarded as stupid, lazy, selfish, ugly, dishonest, isolated, and teased; while the leaner children were regarded as clever, healthy, attractive, kind, happy, popular, and desirable for a friend. In another study by Hill and Silver (1995) 9 year old children regarded the overweight as having poor social function, low academic achievement and low health status. Tiggemann and Anesbury (2000) investigated the stereotyped attitudes about obesity among children. Most children hold the view that obesity development is under the control of the individual child and therefore children should be held responsible for their body weight. A study by Pierce and Wardle (1997) found that obese children felt extremely bad about their bodies, they felt responsible for their body size and thought that they had few friends and were excluded from social activities because of their body size.

Other than peer rejection, adult rejection is also known to be a cause of discrimination and stigmatisation regarding body weight. Neumark-Sztainer *et al* (1999) studied the beliefs and attitudes about obesity among teachers and school health care providers. Biases about body weight were found, and views that obese children were untidy, emotional, and less likely to succeed were predominant. This indicates that those who should have been protecting children against societal discrimination and stigmatisation also hold the belief that obesity is largely due to lack of self-control. In a recent systematic review Sikorski *et al* (2011) highlighted the need for more robust studies investigating stigmatisation of obese individuals in society.

2.5.3 Socio-economic consequences of childhood obesity

Childhood obesity has been indicated to have severe socio-economic consequences. These may be direct (e.g. through the treatment costs of associated illnesses) or indirect through incapacitating individuals, thereby making them less productive. Sturm (2002) using data from the US Health Care for Communities (HCC) survey studied the cost implications of obesity. He reported that there was a 36% increase in inpatient and outpatient expenditure and a 77% increase in medication among the obese, compared with their leaner counterparts. Estimating the cost of childhood obesity has so far been a very difficult task worldwide. Wang and Dietz (2002) attempted to examine the economic cost of obesity-related diseases among young people aged between 6 – 17 years old in the US. They used national hospital discharge survey data collected between 1979-1999. They found that obese children spent longer times as inpatients compared to their leaner

counterparts; they estimated 1.7% of the total US hospital costs to be obesity-associated inpatient cost.

In the UK, obesity alone has been known to cost the economy £1 billion a year directly and between £2.3 and £2.6 billion a year indirectly (Report of the Comptroller and Auditor General, 2006); projections had indicated that if uncontrolled, it would cost the economy £3.6 billion a year by 2010. The Foresight report has predicted that by 2050, obesity will be one of the leading conditions costing the UK economy heavily (Foresight, 2007). This is one of the reasons why there is a growing national concern over obesity in the UK (Hawkes, 2007). However, many commentators have seen this as a 'moral panic' rather than a real one. Cohen *et al* (2005) have argued that focusing on obese and overweight individuals is harmful to community health. They suggest that over emphasising 'obesity' has made this complex issue appear simple. In this way, obese and overweight individuals have been held responsible for their condition without society acknowledging the contributory social and economic factors in their homes, places of work or recreation. This argument was supported by the Foresight report (2007) citing the need to recognise the role of the environment surrounding families in exacerbating obesity rather than placing the blame on individuals. Children in particular can do little to change the environment they grow in and the set of behaviours they adopt. Holding obese children responsible for their condition is not only unhelpful; it can potentially push them in the direction of behaviours that continue to exacerbate the condition of obesity. Obesity is a societal problem which needs concerted multidimensional approaches targeting prevention rather than treatment (Foresight report, 2007). The next sub-section discusses approaches to prevention of childhood obesity.

2.6 Interventions for preventing childhood obesity

Preventing or remediating childhood obesity requires multi-dimensional approaches to change the attitudes, beliefs, lifestyles and the environment in the societies where children live. Certainly this takes a long time and requires dedication from all stakeholders (Foresight report, 2007). Perhaps a glimpse of the issues about developing interventions for combating childhood obesity can be caught in the next sub-section.

2.6.1 Developing interventions for preventing childhood obesity

In designing intervention programmes to prevent childhood obesity, many have thought it necessary to target the immediate modifiable risk factors for the condition, namely diet and physical activity. Prevention strategies, such people have argued, need to encourage an increase in physical activity levels (energy expenditure) whilst reducing energy intake, creating a negative energy balance that would potentially lead to weight loss (Barlow, 2007; Lissau *et al.,* 2002; Summerbell and Hillier, 2010).

An emphasis on increasing the energy expenditure side of the equation is often simply interpreted as a need to increase physical exercise; this undermines the real issue of tackling generally sedentary lifestyles. The number of hours taken in physical exercise will always be a very small proportion of the day, so emphasis should be put also on the level of activity which is not active exercising, for instance, undertaking housework, moving to and from school, reducing television watching and so on (Lissau *et al.,* 2002).

In the same way, emphasising the energy intake side of the equation by reducing food consumption may send a wrong message which has been found to lead to eating disorders such as anorexia and bulimia especially among teenagers (Caprio, 2006). It is therefore considered preferable for any prevention programme to emphasise healthy eating rather than reducing energy intake. Lissau *et al* (2002) suggested that a balanced diet with all the nutrients in the right proportions is necessary for children. Eating practices like having meals together as a family are critical to children's development of good dietary habits, and therefore could be taken into consideration when designing prevention programmes for childhood obesity. In terms of frequency of meals for children, three major meals could be recommended together with two or three low energy snacks per day. Lissau *et al* (2002) argues that healthy eating does not only involve what is eaten by a child, but involves a whole lot of issues to do with the environment in which food is prepared and eaten. Children in families need to be involved in cooking the food they eat. Children continue the eating patterns they learn in childhood into adulthood. The impact of skipping some meals such as breakfast has been widely studied and there is evidence to suggest that skipping breakfast can have adverse effects (Lissau *et al.,* 2002). Prevention programmes therefore need to focus on encouraging parents to prepare breakfast for their children since it has been shown to improve performance in the cognitive domain (Benton and Brock, 2010; Murphy *et al.,* 1998). Regular eating of the other meals should also be encouraged, snacking during

television watching could be discouraged, snacks with fruits and vegetables could be encouraged while snacks with high energy and fat content could be discouraged (Lissau *et al.,* 2002).

Childhood obesity prevention programmes could target the key individuals or institutions that can effect change in behaviours and lifestyles of children. Examples of these individuals and institutions include parents, schools, health professionals, government etc. But the key question to address here is whether interventions to combat childhood obesity are effective. The next sub-section discusses this question.

2.6.2 Effectiveness of interventions for preventing childhood obesity

In the UK, some intervention programmes have been developed and implemented in an attempt to prevent childhood obesity. These range from experimental studies, to government sponsored and franchised programmes. Examples of these programmes include MEND (Mind, Exercise, Nutrition, Do it); FBBT (Family Based Behavioural Treatment); WATCH IT and CHANGE 4 LIFE (Edwards *et al.,* 2005; Sacher *et al.,* 2005; Rudolf *et al.,* 2006).

Campbell *et al* (2001) conducted a systematic review to establish the effectiveness of the available intervention programmes in preventing childhood obesity. Seven studies were eligible for inclusion, three of which were longitudinal and four cross-sectional. They found that the quality of the data was limited and felt they thus could not draw any generalisable conclusions. Later, Summerbell *et al* (2005) wanted to build on Campbell's previous review by including new evidence and also by taking into consideration information that was sought by the public health decision makers at the time. Using a robust search strategy, they obtained 22 studies for inclusion of which 10 were longitudinal and 12 were short-term. They found that most studies that combined dietary and physical activity interventions did not significantly improve the weight status of children, but those studies that focused on either dietary or physical interventions alone showed some small positive change in the weight status of the children. Recently Luttikhuis *et al* (2009) conducted a review on treatment programmes, they carried out a rigorous search of various electronic databases for randomised control trials directly investigating lifestyles, and drug and surgical interventions published between 1985 and 2008. They selected 64 trials, 12 of which investigated lifestyles, six trials investigated diet, 36 trials investigated programmes aimed at changing behaviour and 10 trials investigated drug interventions. A meta-analysis identified that lifestyle interventions targeting children

and adolescents indicated a reduction in obesity at six and 12 months follow up. They concluded that quality evidence to suggest effectiveness of one intervention over the other is significantly limited; however, interventions targeting behavioural lifestyles could result in a considerable reduction in overweight and obesity.

Although the evidence for what works in preventing childhood obesity has been, at best, equivocal (Ma and Frick, 2011), there is a general consensus among researchers, health practitioners and policy makers that childhood obesity is of multifactorial genesis. Tackling it thus needs a multidimensional approach. However whether interventions to prevent childhood obesity should be universal or targeted towards only the obese children is a dilemma that continues to cause serious yet unresolved debates (Lissau *et al.,* 2002). Ells *et al* (2005) strongly supported the use of universal approaches for preventing childhood obesity, based on the fact that obesity begins early in life, yet there are no methods by which children at risk of obesity can be identified with precision. This means that by targeting only the obese children, a large proportion of children at risk of obesity who are often missed by the available tests would be left to develop obesity in adulthood. Thus it is preferable to target the whole population in childhood obesity prevention programmes, especially in terms of behavioural changes among families as the next sub-section discusses.

2.6.3 Changing lifestyle behaviours to prevent childhood obesity

Changing lifestyle behaviours has been central to health promotion including the efforts geared towards combating childhood obesity. Over the past decades, the desire for behavioural change has led to the development of different theories for changing behaviour in society (Ory *et al.,* 2002). Bunton *et al* (1991) documented the common theories developed for changing behaviour over the past years. Early attempts to change behaviours were often predicated on the primacy of information-giving. Bunton characterises such approaches as 'communication theory', the principle being that providing information to the target population can potentially induce behavioural change. Interventions involving media campaigns are fundamentally based on the assumptions of this theory.

In the early 1970s, Becker (1974) and Rosenstock (1974) recognised that such approaches did not take into account a number of factors that are significant for behaviour change. They therefore developed another theory of behaviour change which among other things emphasised the perception an individual holds towards the condition caused by the behaviour that would need to change. It also took into

consideration the perception of the targeted individuals towards the negative effects of the condition under question.

In the 1980s Bandura (1986) developed the social learning theory which emphasised changing behaviour through encouraging individuals to develop the necessary skills to adapt to the change needed, and provide models for the changed behaviour needed. During the same period, Ajzen and Fishbein (1980) developed another theory which emphasised social aspects that influence behavioural change, such as beliefs and attitudes. They argued that the intention for behaviour is very important, thus interventions aimed at changing behaviour need to consider the wider socio-aspects such as the intention of individuals in doing a particular behaviour.

Prochaska and DiClemente (1986) developed the trans-theoretical model of behavioural change. This model suggests that behavioural change goes through five stages namely: the pre-contemplation stage, contemplation stage, preparation stage, action stage and the maintenance stage. During the precontemplation stage individuals do not realise that it is necessary to change behaviour. In the contemplation stage, something happens to individuals and makes them realise that there is need to change behaviour. Then in the preparation stage an individual begins to prepare him/herself to change behaviour. In the action stage an individual begins to make the necessary change in behaviour. Then in the maintenance stage an individual puts in effort to maintain the new behaviour adopted.

It has been widely acknowledged that most of these models fail to integrate the role of the community in delivering the change needed (Bunton *et al.,* 1991). Additionally, these models tend to describe the complex process of behavioural change as a simple sequence of events without allowing for repeated episodes, attempts to change ending up in failures and what happens when failure occurs. Practically, behavioural change involves moving back and forth between stages, however, the models of behavioural change do not demonstrate the loops that could exist between earlier stages and later stages. It is therefore appropriate to take caution when developing interventions for behavioural change basing on these models. Nevertheless, evidence has indicated that several interventions based on the models described above have had a positive impact towards behavioural change in different situations (Glanz and Bishop, 2010).

The UK Government's attempts to halt the rise in childhood obesity have included implementing the National Child Measurement Programme (NCMP) – developed in 2005. The next section describes the NCMP in detail. But first the summary of key messages regarding childhood obesity is presented in the Box 2.1 below.

Box 2.1 Summary of key messages on childhood obesity

- The accuracy of BMI in assessing childhood obesity is similar to that of sophisticated techniques such as DXA, MRI etc. However BMI is preferred for use in epidemiological studies because it is cheap and easy to apply.
- Worldwide, childhood obesity has been increasing rapidly in the past decades; however, recent evidence indicates that in the past few years, the rising trend in childhood obesity may have slowed and levelled.
- Childhood obesity is thought to develop as a result of the imbalance between energy intake and energy expenditure. A number of factors contributing to the obesogenic environment have been identified as exacerbating this imbalance.
- Childhood obesity is linked to physical health problems in childhood and later in adulthood; however, psychological problems have been indicated to be the most serious immediate consequences of childhood obesity.
- Interventions for preventing childhood obesity have been developed; however, there is only relatively limited evidence for the effectiveness of these interventions in controlling or remediating childhood obesity.
- Changing people's lifestyle behaviours from sedentary towards more active lifestyles has been identified as a key step towards combating childhood obesity. However, more commitment is needed from all stakeholders including health authorities, local authorities and central government.

2.7 The National Child Measurement Programme (NCMP)

Recognising the steady increase in childhood obesity, the UK government in 2004, as part of its Public Service Agreement (PSA) targets, identified the need to stop the year on year rise in obesity among children aged below 11 years in England by the year 2010 (Ells *et al.,* 2010; Shucksmith *et al.,* 2009). Responsibility to achieve this target was shared among three government departments namely: the Department of Health, the Department of Education and Skills and the Department for Culture, Media and Sport (Department of Health, 2006). In order to monitor the progress of the PSA target, the UK government in 2005 introduced the NCMP in which the BMI

of children would be measured as they entered primary school in the reception year and as they left in year six. A requirement was therefore placed on all PCTs to measure the height and weight of the children in reception year (4-5 years) and in year six (10-11years) (Shucksmith *et al.,* 2009). It was also thought at the time that this data might be used to inform local planning and to ensure appropriate targeting of resources and interventions to areas that needed them most (Department of Health, 2006).

The first roll out of the programme in 2005/2006 sparked debate from researchers and professionals. Hawkes (2007) thought that the programme was highly misleading in terms of statistics and Crowther *et al* (2007) criticised it for initiating a feeling of victimisation among children and parents who were overweight and obese. Shucksmith *et al* (2009) in their pilot study identified a number of complex issues regarding consent and confidentiality during measurement and after; considerable misunderstanding of the exact purpose of the entire programme among parents, children and schools; and unfulfilled anticipation of treatment amongst parents for those who were obese, which was contrary to the aim of the programme at that time.

Faced with all these concerns, it was time for the government to think about ways of implementing the programme to address the concerns at the time. Consequently, by 2007 the Department of Health issued guidelines to PCTs for the 2006-2007 roll out which attempted to address the raised concerns. Among others, the guidelines emphasised the need for schools to identify private places where the measurements would take place in order to ensure maximum confidentiality and respect for the dignity of the children (Department of Health, 2007). PCTs were also advised to make the measurement process more flexible and friendly, and to situate the programme in a wider context of healthier lifestyles in order to reduce anxiety among the children (Shucksmith *et al.,* 2009).

Although originally the NCMP was meant for general population surveillance purposes, it has now been pushed towards being a screening programme. The original design of the programme did not involve identifying 'caseness' as it was a population level surveillance programme, and only those parents/guardians who were interested in knowing the BMI results of their children and made contact with the PCT would actually receive them (Shucksmith *et al.,* 2009). However soon after its implementation the programme received a lot of attention from the health

professionals, researchers, politicians and the media. The government also saw in this programme an opportunity of providing a channel through which parents could be informed about their child's weight status in an attempt to bring to their attention the growing problem of childhood obesity. It was hoped that this would act as an important spur to both the parents and their children to think of healthy lifestyles and children's wellbeing (Cross-government Obesity Unit, 2009; Shucksmith *et al.,* 2009). Consequently in 2007, the Department of Health came under pressure from a House of Commons Select Committee to announce changes to the NCMP emphasising that as of 2008/2009, it would be a requirement for PCTs to deliver universal feedback of height and weight measurements to parents and their children provided the resources were available (Lake, 2009). Although there was no clear purpose for this, the government insisted that this would act as the best way to engage both parents and children in strategies for improving lifestyles (Department of Health, 2007). By this recommendation, a surveillance programme had in a stroke been turned into a screening programme, a move which has exposed it to a significant volume of criticism on a number of grounds.

A number of researchers have argued that a comparison of the NCMP against the National Screening Committee criteria reveals that it does not satisfy the normal criteria for a screening programme (NICE, 2006; Nihiser *et al.,* 2009; Summerbell *et al.,* 2005). According to Westwood *et al* (2007) the most important criteria that a screening programme should meet is the use of a simple, safe and validated test to screen for cases. This criteria is allegedly not met by the NCMP, which thus invalidates it as a screening programme. The NCMP uses BMI calculated from height and weight measurements to identify the children in the different categories of weight status. The technique of measuring height and weight and comparing the subsequent BMI against population norms to assign categories of 'overweight', 'obese' and so on has been shown to be highly complicated and contentious on a number of fronts as discussed in Section 2.2.4.2. Moreover, the quality and consistency of measurements taken by agents of the PCTs responsible for measurement (usually school nurses, but sometimes health care assistants or specially trained squads) is an issue of great significance in assessing legitimacy of this as a screening tool (Levine *et al.,* 2007).

Further to this, Shucksmith *et al* (2009) point to the fact that screening programmes are only usually deemed to be ethical if they 'do no harm' (i.e. if the test produces overall gain for the patient despite the anxiety that testing normally induces) and if

there are effective interventions that exist to deal with those cases/people identified to have a problem. But, as we have seen, the systematic reviews conducted by Campbell *et al* (2001), Summerbell *et al* (2005) and Luttikhuis *et al* (2009) – already discussed in Section 2.6.2 – indicated that little evidence exists for the effectiveness of the available interventions to combat childhood obesity. This poses a serious challenge to the recommendation of the Department of Health to routinely feed back height and weight measurements to parents and children.

However the UK government continues to insist that the NCMP is not a screening programme (Lake, 2009), but PCTs still remain charged with a duty to carry out and report the measurements and as the data accumulates, there is no doubt that it becomes ever more likely to drive local planning around obesity prevention, even if its efficacy in inducing individual behaviour change remains suspect.

2.7.1 Routine feedback of the NCMP results to parents/guardians and their children

The Cross-Government Obesity Unit (2009) has reported that in the 2008/2009 programme year, about 50% of the PCTs fed back the height and weight measurements to parents regardless of whether or not the parents asked for the results. Feedback letters, other than identifying the BMI of children together with comparator figures to help the parent identify the category of weight status of their child, generally give a few points about advice on healthy diet and physical activity.

Routine feedback of BMI results has been practiced in a number of states in the USA (Justus *et al.,* 2007; Nihiser *et al.,* 2007). However this strategy towards combating obesity has been heavily criticised for engendering a feeling of personal responsibility for obesity rather than promoting a more contextualised approach that focuses on the role of environment and society in causing obesity (Foresight, 2007). Several authors have suggested that simply telling parents the weight and height measurements of their children may be only the first step in a much longer process of reversing or changing family behaviours with respect to nutrition and exercise, and that health workers will need significant training to be able to spot 'readiness for change' in parents and then support it (Howard, 2007). Evidence from the USA, where routine feedback of BMI results is mandated in some states, indicates some very undesirable outcomes from screening, including unsupervised medication of young children with adult diet pills, restriction of nutrition (even for ideal weight children) leading to potential growth problems and so on (Ikeda *et al.,* 2006).

Despite the criticism, the English government in the April 2009 policy document entitled *Healthy Weight, Healthy Lives* (Cross-Government Obesity Unit, 2009) has made it clear that PCTs should ensure that parents and carers routinely receive the height and weight measurements taken as part of the NMCP and have promoted it as the best way to engage parents/guardians and their children into a healthy lifestyles strategy (Cross-Government Obesity Unit, 2009).

The body of evidence examining whether parents/guardians like to receive the height and weight measurements of their children from school based measurement programmes is equivocal and tells conflicting stories. In a study conducted in England by Grimmett *et al* (2008) 50% of the parents with overweight children reported positively changing health behaviour as a result of the weight feedback they had received. However this was an experimental study set up before routine feedback of height and weight measurements from PCTs had been implemented. The evidence from this study is therefore not representative of the natural occurrence of the reactions of parents towards routine feedback. Nihiser *et al* (2007) also reported that many studies in the USA indicated that parents prefer to be sent the BMI results provided they are expressed in a neutral way without placing any blame on anyone. It is however contested whether the findings of this study can be applicable in the UK, given that the USA has different health and school systems from UK. These factors are important because the reactions of parents/guardians largely depend on the way the authorities implement the measurement programme which would largely depend on the nature of the system.

Boozman (2008) studied the trends in the implementation of BMI measurements and feedback between 2005 and 2008 in Arkansas. He identified that by 2008, the majority of the parents (87%) reported being aware of BMI measurement programmes, 68% of the parents reported being comfortable with receiving BMI reports from school and 67% reported that they had found the BMI report very useful. Of note, Arkansas was among the first of the states in USA to implement legislation mandating universal school-based weight monitoring programmes. In 2003, the Arkansas Act 1220 providing for the need to monitor the weight and height of school children was implemented (Raczynski *et al.,* 2009). Although this act met a lot of resistance from sceptics who thought that this exercise could have negative social and psychological consequences, Phillips *et al* (2010) have noted that none of the anticipated negative consequences as a result of the school-based measurement process in Arkansas schools has been realised. In fact, significant

changes in school environments in respect of nutrition, physical activity, policies and so on, are being realised. Thompson and Card-Higginson (2009) have highlighted the need for other regions to use the Arkansas experience to implement legislation mandating universal monitoring of weight status among school children. They have argued that it is of particular importance to raise awareness about childhood obesity among families with a view of enabling them to support interventions aimed at combating childhood obesity. It is debatable whether or not the success of this strategy in Arkansas can be easily transferred to another region with a completely different education system and population. However, the UK is one of the countries that have used the Arkansas experience to implement a programme (NCMP) for monitoring the weight status of school children. A recent study conducted by Mooney *et al* (2010) about the early experiences of routine feedback to parents identified that most parents who took part found the feedback useful, although parents of children identified to have weight problems were more likely to report finding the feedback useless. It is important to note that this study used telephone interviews, a factor which may affect the quality of data obtained.

Routine feedback of the weight results to parents may be of great importance since evidence points to the fact that many parents are unable to identify their overweight children as being overweight (Cross-Government Obesity Unit, 2009; Wald *et al.,* 2007). A study by Baughcum *et al* (2000) showed that the majority of the mothers of pre-school children did not see their overweight children as being overweight and this was most noticeable among women with low education levels. In a later study by Etelson *et al* (2003) children aged between 4-8 years old who were overweight could not be identified by their parents as having weight problems although all parents were aware of the risks associated with childhood obesity and overweight. The authors however discussed the unwillingness of parents to consider their children obese or overweight even when they recognised it in their children. Also, Carnell *et al* (2005) studied 564 parents of children aged between 3 – 4 years old. They found that only 1.9% of parents of overweight children could identify them as overweight. A later systematic review by Parry *et al* (2008) identified that more than half of the parents in all studies reviewed could not accurately identify obesity and overweight in their children. In fact they concluded that it is not appropriate to rely on parents to address issues of child weight problems, and that instead screening programmes that identify children with weight problems should be encouraged. More recent systematic reviews using studies conducted in different parts of the

world have supported the argument that parents cannot identify weight problems in their children (Doolen *et al*., 2009; Towns and D'Auria, 2009).

In contrast however, Boutelle *et al* (2004) found that mothers could accurately identify the weight status of their adolescent children and thus concluded that they did not need to be reminded that their child was overweight or obese. Boutelle *et al's* (2004) study however involved parents of adolescents rather than younger children as in the above mentioned studies and data was collected using telephone interviews. The difference in the study population together with the potential effects of collecting data using telephone interviews could explain the difference in the observations made in this study compared to the others.

Even then, Neumark-Sztainer *et al* (2008) in their study of 314 parents of adolescents participating in the Eating Among Teens project found that parents who could accurately recognise overweight and obesity in their adolescent children were not more likely to engage into behavioural changes compared to those parents who could not recognise overweight and obesity in the children. The debate therefore could shift away from whether or not parents can recognise obesity and overweight among their children, to the best way to bring parents on board to support interventions aimed at combating weight problems. In this case, routine feedback could be an important factor that could raise awareness among parents about weight problems (Cross-Government Obesity Unit, 2009).

If routine feedback should be given, questions arise about how it should be given to the parents without causing harm or discomfort. There is evidence to suggest that some terms used to describe weight status are regarded as derogatory and would cause psychological harm to those deemed to have a weight problem; such terms include 'fat' and 'obese' (Hill, 2009; Strauss, 2002). Wadden and Didie (2003) emphasized that use of such terms can instigate annoyance among all people and can potentially deter the attention which would be placed on the important aspect of weight. They suggested that advocates for the approach of 'telling it as it is' and confronting people with their problems forget the demeaning moral implications that such derogatory words can carry and the likely consequences of drawing those with the problems further away from the help they would have got.

Further to avoiding use of derogatory terms in giving the feedback, follow up could be made especially for those deemed to have a problem. Resnicow *et al* (1993)

studied what parents did when they received a letter from the Know Your Body school health promotion programme, which reported a child's weight results and recommended seeing a doctor if the results of the child were out of the normal range. They found that the majority of parents (86%) had discussed the results with their children but only 12% of the parents had seen the family doctor about the results. In a recent study by Mooney *et al* (2010), 1 in 3 parents reported thinking of changing lifestyle behaviours in terms of diet and physical activity, with an insignificant number reporting ever seeking help regarding their children's weight problems. Jones *et al's* (2011) findings from the Gateshead Millenium Study could provide an insight into this phenomenon. They argue that parents do not see child weight problems as their responsibility or the responsibility of their family. This could explain why many parents are not bothered about changing lifestyles at the family level. Amidst this debate, it is important to clearly understand the evidence supporting the significance of the NCMP as the next section discusses.

2.7.2 Significance of the National Child Measurement Programme

The NCMP has been the subject of debate since it was first implemented in 2005. These debates are particularly centred on the need for this programme. Advocates for the NCMP argue that it is an indispensable programme which will not only provide data on which local authorities can set goals to tackle obesity but that it can also be very influential in implementing the Healthy Weight, Healthy Lives strategy (Cross-Government Obesity Unit-COI, 2009). However critics of the programme see it as unnecessary and a mere waste of resources. They argue that the implementation of routine feedback simply makes it a screening programme, but one with no evidence for clinical and cost effectiveness (Foresight report, 2007; Rao *et al.,* 2006).

Owing to the lack of a robust data set on which to base national, regional or local plans, it would seem that the NCMP could be very important in generating this data set. However key questions arise as to whether it is necessary to make the programme universal or whether the data set could still be generated from a robust nationally representative sample drawn by using statistical procedures (Shucksmith *et al.,* 2009). Fry (2008) and Gleeson (2008) maintain that a well selected sample using a sampling frame from GP surgeries would be more relevant for the purpose of generating a suitable data set. They further argue that the NCMP, despite being resource intensive, still does not provide a complete universal data set. This is because some schools and children that do not meet the inclusion criteria are excluded. For example private schools are excluded, special schools for children

with learning and physical disabilities are also excluded, schools and special units for children with behavioural problems are excluded as well. There is also a considerable number of children who opt-out and most probably these are likely to be children with weight related problems. This therefore has the potential to make the distribution of the data skewed. Further to this, the robustness of the data set from the NCMP would still be in jeopardy. Shucksmith *et al* (2009) highlighted other potential flaws that may be associated with this dataset. They argued that the implementation of the programme allows for measurements to be taken across the whole year which means that there would be a wide variability in the age of children at the time they get measured. The NCMP data set therefore would not be age-specific.

However critical appraisal of the pros and cons of using a sample data set rather than a universal one does not identify any superiority of the sample data set. Shucksmith *et al* (2009) identified that taking samples would be as labour intensive as doing a universal survey, which could withstand small dropout rates of 5-10%. In their report, the Cross-Government Obesity Unit (2009) have indicated that the response rate for the 2007/2008 programme was 88% which suggests that the data set would be more representative of the entire population of children.

In terms of generating an anonymous data set for the purposes of enhancing local planning, the NCMP seems to be highly suitable (Ells *et al.,* 2010). Although Westwood *et al* (2007) have suggested that early identification of children at risk of overweight would lead to early interventions being put in place, the findings of Summerbell *et al* (2005) and Luttikhuis *et al* (2009) about the ineffectiveness of the available interventions for managing childhood obesity, would lead one to question why anyone would want to identify children at risk of obesity/overweight when clearly there is nothing much that can be done for them. Whether or not the NCMP will end up doing more 'harm' than 'good' would largely depend on the way it is implemented and how it comes across to the parents, children and school authorities. The next section discusses implementation of the NCMP.

2.7.3 Implementation of the National Child Measurement Programme

It is currently the role of PCTs to implement the NCMP. These work in partnership with schools, local authorities, the NHS Information Centre (IC), Strategic Health Authorities (SHAs) and other organisations like the National Obesity Observatory. The Cross-Government Obesity Unit (2009) identified the different responsibilities of each of the partners in implementing the NCMP. For instance PCTs (mainly through

the school nurse service) are responsible for taking the height and weight measurements and ensuring that they are sent to the NHS IC. However Rao *et al* (2006) argued that other than the lack of school nurse capacity to cover all the schools, it is also a mistake to use health professionals to deliver this programme. The rationale behind their argument is that this medicalises the whole programme, converting a societal lifestyle problem into a clinical one requiring medical intervention. They suggest that it would be better to employ school nurses in community-based initiatives to combat obesity rather than getting them to measure children. Instead, they suggest, the measurement process could be incorporated into the school curriculum and be conducted as part of numeracy activities in class. This would mean that it is the school staff and their assistants who would carry out the measurements.

Schools have the responsibility to provide class lists of the children to be measured and also to identify a suitable place where measurements can take place on the school premises, ensuring privacy and without impinging on the dignity of the children. Kubik *et al* (2007) noted that children need privacy both from the eyes of other children and also from teachers. However Shucksmith *et al* (2009) in their study about the implementation of the NCMP in a sample of schools in the North East of England made a critical observation about the difficulty schools face in providing a truly private place for the measurements. They concluded that unless more information is delivered to the staff about the meaning and purpose of the measurement exercise, and the need to combat weight-related stigmatisation and bullying, little is likely to be achieved in this area.

The NHS IC has the responsibility to collate and validate all the data from the different local areas. It also prepares and disseminates data upload tools and parental feedback tools. Shucksmith *et al* (2009) have identified problems in data recording and storage; this stems from the recent recommendation to feedback the height and weight measurements of the children to parents. With this in place it means that data is no longer completely anonymous, it must bear the names of the children and other details at least for one month to enable development of the feedback letters and matching them to the right child. This makes it possible to link individual data to other variables such as intelligence, parental economic status, ethnicity, school results and residential area. This exacerbates the problems linked to data storage and confidentiality.

The SHAs ensure achievement of the highest participation rate possible for all children who meet the inclusion criteria. This issue is very important as far as generating a robust national data set is concerned. Studies conducted in the USA where universal measurements of school children are mandated in some states show that parents are always not bothered when their children take part in the measurement programmes, thus they report a response rate of over 90-95% (Justus *et al.,* 2007). Nihiser *et al* (2007) reported that most studies conducted in the USA had found that parents responded positively and supported school based weight screening programmes, provided that privacy and respect for children's feelings and choices were given top priority. In the UK, Grimmett *et al* (2008) recently conducted an experimental study about school based measurement programmes in schools in London; they found that only 3% of the eligible participants declined to participate. The analysis of the 2007/2008 NCMP data shows that the participation rate was 88% (Cross-Government Obesity Unit, 2009); however this does not attest to the enthusiasm of parents to allow their children to take part in school based measurement programmes. It just attests to issues about compliance, in that parents do not opt in but instead, if they would not like their child to take part they have to opt out and this could be the reason behind the high response rates.

Local authorities have the responsibility to promote the programme and to ensure that schools and the PCTs have good working relations. Shucksmith *et al* (2009) noted that there is a wide variability in the degree of liaison between the PCTs and schools in different regions and that PCTs almost entirely rely on the goodwill of the schools to be cooperative in executing the NCMP. Improvements in the working relations between the schools and the PCT are likely to lead to desirable results.

The National Obesity Observatory, among other roles, ensures that guidance on the assessment and evaluation of interventions for weight management is in place, it also analyses data and reports on the progress against the set targets, and provides a summary of the evidence to practitioners, thus supporting them (Cross-Government Obesity Unit, 2009). Proper implementation of the NCMP could have a positive impact on negative perceptions of the NCMP. The next section discusses the implications of the NCMP.

2.7.4 Implications of the National Child Measurement Programme

Prior to implementation of any screening or surveillance programme, it is important to establish that the advantages outweigh the risks of any physical or mental problems to the people being targeted (Westwood *et al.,* 2007). The NCMP, by

feeding back the results to parents identifies some children as being overweight and obese which could be associated with psychological consequences (Shucksmith *et al.,* 2009). Emphasising the risk of obesity/overweight instead of focusing on healthy weight may cause fear, victimisation, bullying, shame, eating disorders, social stigma and discrimination (Scheier, 2004).

In a study by Chomitz *et al* (2003) most children whose parents were informed that their children were overweight ended up being put on diet restrictions, forced to skip some meals or even given diet pills. Crawford *et al* (2006) inclined to the view that such behaviours are likely to worsen the child's problems rather than solve them. Such behaviours are more likely to be due to the fact that parents are told of the news of their children being overweight or obese but then are not given adequate supporting information to enable them to identify what to do with the situation. Thus Crawford *et al* (2006) concluded that if sending feedback to parents, there is a need to accompany it with the necessary supporting information to prevent panic which may lead to a potentially dangerous reaction.

Similarly, whilst a study by Grimmett *et al* (2008) did not find any associations between BMI feedback and dietary change for ideal weight children, there were changes in dietary patterns reported among overweight children, with more dietary restrictions increasing among overweight girls. As already mentioned however, this was an experimental study set up before routine feedback had been implemented. Boozman (2008), analysing the data from the Arkansas programme for combating childhood obesity, found that there was no increase in diet pill intake among students, nor was there any increase in the student's concern about weight, and parents had not put their children on diets. This has been supported by Raczynski *et al* (2009) and Phillips *et al* (2010). Evidence from the Arkansas studies seems to be superior due to the fact that the measurement programme has been running for a substantial amount of time in this state, and the methodologies used are robust. However, the key question we are constantly confronted with is whether we can use evidence from the Arkansas experience to draw conclusions about UK populations.

Moreover giving the information to parents about their child's weight status does not mean that the parents would take action about it. Knowing the child's weight status is only the first step in a much longer process of behaviour transformation (Howard, 2007; Jackson *et al.,* 2005; Neumark-Sztainer *et al.,* 2008), which is dictated by many factors such as willingness to change, readiness to change, motivation and

dedication. Health authorities therefore could take into consideration all these factors, especially when feeding back measurement results to parents.

Overall, the NCMP still appears controversial and has been criticised as unethical in being a form of screening programme with no clear or effective interventions available for those detected as having a problem. Consequently critics have voiced the fear that a measure taken to promote better physical health in children may inadvertently result in poorer mental health, with both parents and children feeling stigmatised and anxious about the child's weight status. The next section discusses mental health in children. But first the summary of key messages regarding the NCMP are presented in the Box 2.2.

Box 2.2 Summary of key messages regarding the NCMP

- The NCMP measures children's height and weight at school, in reception (4-5 years) and again in year six (10-11 years). It has been the responsibility of PCTs to implement the NCMP.
- Originally, this programme did not involve identification of 'caseness'; it was meant for surveillance purposes, specifically to inform local authorities as to how better to target interventions for combating childhood obesity to those areas that needed them most.
- In 2008, the Department of Health, under pressure from a select committee of the House of Commons, recommended feeding back the NCMP results to parents and children.
- The policy makers saw an opportunity in routinely feeding back the NCMP results to raise awareness with families about the risks of childhood obesity and to encourage families to support interventions to combat childhood obesity.
- But with this recommendation in place, what was originally a surveillance programme was turned into a screening one in a single stroke; although health authorities are reluctant to consider it as such.
- In light of the lack of adequate evidence for what works in managing childhood obesity, this move has been criticised as being one that identifies children with problems when it cannot adequately provide solutions to these problems.
- More importantly it is not known what impact telling families a child's weight status has got on the mental wellbeing of children. Neither is it clear whether or not routine feedback from the NCMP can act as an important spur to families to think of adopting health lifestyles.

2.8 Mental health in children

Child mental health started receiving attention soon after the Second World War. It was the WHO that first undertook research to investigate aspects of child mental health in the 1948 United Nations study of the effects of homelessness on children. Through the past decades research evidence has shown mental health to be an integral part of overall health, there is no doubt that mental health and physical health directly affect each other (WHO, 2001). The WHO definition of health identifies mental health as a fundamental part of health:

> …a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity (WHO, 2001, pg. 1).

But defining mental health still remains a subject for debate. Several aspects such as cultural variations, individual assessments and emerging theories from different disciplines have made it increasingly difficult to derive a conventional definition for mental health (WHO, 2001). But amidst the conflict of interests it has become increasingly clear that mental health does not only encompass absence of a mental problem in an individual (Huppert *et al.,* 2009); and it is generally agreed that mental health has got two constructs at its extreme ends and these are mental wellbeing on one end and mental illness on the other (Shucksmith *et al.,* 2009).
The WHO (2001) broadly defined mental health as:

> …..a state of wellbeing in which the individual realises his or her own abilities, can cope with the normal stresses of life, can work productively and fruitfully, and is able to make a contribution to his or her community (WHO, 2001 pg. 1).

The following sections describe the two constructs of mental health in children.

2.8.1 Mental wellbeing in children

Wellbeing as a concept has always triggered debate among health professionals, researchers and policy makers. There seems to be no agreement on what constitutes wellbeing. However there are two main perspectives in which wellbeing can be viewed namely, the hedonic perspective and the eudaimonic perspective (Ryan and Deci, 2001).

The hedonic perspective involves viewing wellbeing in terms of happiness and avoidance of pain. This view is thought to have begun with the teachings of the Greek philosopher Aristippus, that the ultimate goal of life is to experience highest pleasure and happiness. This view was developed by later philosophers such as

Hobbs, DeSade and Bentham who argued that good societies are built through individuals attempting to maximise happiness and pleasure (Kahneman *et al.,* 2003; Ryan and Deci, 2001).

On the other hand, the eudaimonic approach does not view wellbeing in terms of happiness but instead involves viewing wellbeing in terms of the extent to which an individual is psychologically functioning (Adi *et al.,* 2007; Huppert *et al.,* 2009; Sandvik *et al.,* 2009). Earlier philosophers like Aristotle considered the idea of defining wellbeing in terms of happiness as vulgar. He argued that this simply enslaves human beings to be followers of desires, and he added that true happiness comes from a person doing what he/she feels is worth doing (Ryan and Deci, 2001).

Mental wellbeing in children is perceived in these two perspectives. Based on the recommendations of the Mental Health Foundation and on the work commissioned by NHS Health Scotland in 2006, Adi *et al* (2007) developed a broad definition for child mental wellbeing which combined both the hedonic and the eudaimonic approaches of mental wellbeing:

> 'Mental wellbeing in children encompasses emotional wellbeing (including happiness and confidence, and the opposite of depression and anxiety), psychological wellbeing (including resilience, mastery, confidence, autonomy, attentiveness/involvement and the capacity to solve problems), and social wellbeing (good relationships with others, emotional intelligence, the capacity to manage conflict and the opposite of conduct disorder, delinquency, interpersonal violence and bullying)' (Adi *et al.,* 2007).

2.8.2 Mental illness in children

Mental illness (often referred to as mental health disorders or mental health problems) has been defined as a pattern of behaviour or psychological function that occurs in an individual that is unexpected in normal development and often leads to distress and disability or even self harm (Mental Health Foundation, 2006); and can clinically be diagnosed using standard criteria (Shucksmith *et al.,* 2009). There is a wide range of mental illnesses affecting adults and children; however diagnosis of mental illness is still affected by culture, and is therefore a heavily subjective concept. The cut-off points for the behavioural pattern at which an individual should be regarded as mentally ill still remain a matter of doubt for many psychiatrists and researchers.

Mental problems of children are broadly categorised into two, namely externalising and internalising disorders. Externalising disorders include hyperkinetic problems such as Attention Deficit Hyper-activity disorder, conduct disorder and mixed disorders of conduct and emotions. The most common internalising disorders occurring in children include anxiety (which often manifests as separation, phobic and social), depression which more commonly occurs with externalising disorders, eating disorders such as bulimia and anorexia, and autism. These internalising disorders are known to be rare in children in primary school; they are more profound in adolescents and young adults (Adi *et al.,* 2007).

Although mental health has been well documented, significant scepticism still exists about the scale of this problem in children worldwide. The section below explores methods used to assess mental health problems among children.

2.8.3 Assessing mental health in children

Assessing mental health among children is of great importance as it enables the right interventions to be recommended in terms of social, educational and health needs (Meltzer *et al.,* 2003). Iloeje (1992) highlighted the importance of identifying emotional and psychological problems early in life, and Koskelainen *et al* (2000) discussed the need for validated scales in this cause. Generally, assessment of child mental health problems has to be given top priority in all aspects of paediatric practice.

Over the past decades, a number of scales for measuring mental health among children have evolved, with each scale having its own strengths and weaknesses. In light of this, the choice of the scale to use in any study should be dependent on the sensitivity of the scale to measure the particular problem of interest for instance: anxiety, depression, conduct disorders or general mental angst, its psychometric properties and applicability in the population where the study is to be conducted as well as its simplicity for use in the study population. Some of the common scales used include the Rutter questionnaire scale; the Achenbach questionnaire scales (child behaviour checklist, teacher report form, youth self report); the strengths and difficulties questionnaire (SDQ); and the general health questionnaire (GHQ) (Donath, 2001; Goodman *et al.,* 2000; Koskelainen *et al.,* 2000). These scales, explored in Chapter four, have enabled researchers to gain insight into the prevalence of child mental health problems as the next section discusses.

2.8.4 Prevalence of mental health problems in children

Mental health disorders have been known to affect over 25% of all people at some stage of their lives. In the world, over 20% of children and adolescents are known to suffer from mental health disorders that can potentially lead to disability (WHO, 2001). Depression is one of the most prevalent disorders worldwide. It affects 4% of children aged between 12 – 17 years old and 9% of those aged 18 years old. This disorder is now more frequently diagnosed, especially among girls, than ever before (Sourander *et al*., 2004).

A WHO report (2007) identified that in the European region over 2 million children suffer from mental health problems and over 20% of adolescents have a clinically significant mental or behavioural disorder. In the UK, Green *et al* (2005) conducted a mental health survey on a representative sample of the UK child population covering England, Wales and Scotland; they discovered that out of every ten children and young people aged 5-16 years, one had a clinically diagnosable mental health problem. They further identified that it was common for children to have more than one type of common mental problems. More specifically, 4% of children had common internalising disorders such as anxiety and depression, while those with common externalising disorders (namely conduct disorders and hyperactivity disorders) were 6% and 2% respectively (Green *et al.,* 2005). Prevalence of mental problems increased from childhood to adolescence and more boys tended to have mental problems compared to girls.

A similar survey had been conducted earlier by Meltzer *et al* (2000) and their findings were similar to those of Green *et al* (2005). These two surveys identified the commonest mental health problems among children and adolescents to be conduct disorders and emotional disorders, with conduct disorders being more prevalent in boys than girls (Meltzer *et al.,* 2000), while emotional disorders were more prevalent in girls than boys (Green *et al.,* 2005). The prevalence of conduct disorders was shown to be higher in more deprived areas, in those families with only one parent, and in households with no employment (Meltzer *et al.,* 2000).

Adi *et al* (2007) discussed the trend of mental health problems in children and young adults. They argued that mental health problems in children had been increasing rapidly between the early 70s and the late 90s, but that this increase seems to have been slowed in the last decade. But the WHO (2007) have insisted that a wide range of mental problems continues to be underestimated and thus the reported

prevalence of mental health problems is more likely to be far different from the true prevalence. This could be attributed to the fact that it is difficult to determine the point at which mental health problems begin to develop among children as the next section identifies.

2.8.5 Development of mental health problems in children

It is now agreed that the interaction between biological, psychological and social factors forms the basis for an understanding of the cause of mental health problems (WHO, 2001). Morgan *et al* (2007) argued that development of mental health problems among children depends on the balance between the risk and protective factors that are pervasive within the environment where children live. When the risk factors outweigh the protective factors, the likelihood of children developing mental health problems is high and the reverse is true. However, this assumption seems to be too simplistic and it makes the complex problem of child mental health appear simple. There is no doubt that protective and risk factors are important in understanding the cause of mental health problems; however they are just part of the complex process operating at different levels namely (individual, family, community and society levels) to cause mental health problems.

In 2004 the Office for National Statistics (ONS) conducted a survey all over Great Britain in order to identify the prevalence rates of mental health problems and the associated risk factors among children aged between 5-16 years old. Data collected was analysed by Green *et al* (2005) who identified several factors that increased the risk of developing mental health problems among the children. These factors are summarised in Table 2.3 below.

Table 2.3 Showing risk factors for mental health problems among children and adolescents (Adi *et al*., 2007; Green *et al.,* 2005; Meltzer *et al*., 2000)

	Individual factors	Family factors	Community factors
Risk	• Gender • Learning disability • Physical illness • Academic failure • Low self esteem • Developmental delay • Communication problems • Weight status	• Parental conflict • Maternal sensitivity and attunement • Family breakdown • Poor parenting including inconsistent/unclear discipline, hostility, lack of supervision • Physical, sexual or emotional abuse • Parental mental illness • Criminality or substance addiction • Death or loss including 'being looked after' • House hold income	• Socio-economic disadvantage • Homelessness • Disaster • Discrimination • Parental unemployment • Poor school ethos • Bullying • Parental education levels • Deprivation

Whether or not being obese should be considered a risk factor for poor mental wellbeing among children is something that has generated debate. Perhaps a glimpse on this aspect can be caught in Section 2.8.7.

On the other hand, Adi *et al* (2007) summarised the possible protective factors against the development of mental health problems among children into three broad categories as well, namely individual factors, family factors and community factors. Table 2.4 describes these factors.

Table 2.4 Showing protective factors against development of mental health problems among children and adolescents (Adapted from Adi *et al.,* 2007)

	Individual factors	Family factors	Community factors
Protective	• Female • Self esteem • Sense of identity • Self-efficacy (mastery) • Good communication & social skills • School success	• At least one good relationship with an adult either in the family or outside • Authoritative discipline • Support for education • Good inter-parental relationships	• Wider support networks • Access to sport & leisure opportunities • High standard of living • Schools with strong academic and non-academic opportunities • Supportive school ethos • Good relationships with peers

It is therefore of paramount importance to promote the protective factors at all levels namely individual, family, and community. This would contribute to reducing the risk of developing mental health problems for those who may be exposed to the risk factors, thus increasing their chances of leading a normal life, especially in adulthood (Morgan *et al*., 2007).

2.8.6 Consequences of mental health problems in children

Childhood and adolescent mental health problems have had profound consequences at individual, social and national levels in both economic and health terms. It has been estimated that £32 billion is used in England alone to treat mental problems (Youth Access, 2002), yet only a small proportion of those who have mental problems are receiving treatment (WHO, 2001). The big question now is: how much more economic strain will be put on the government to treat all the people with mental problems given this increasing trend? This and other questions demonstrate the enormous burden that mental health problems have on society. On the individual level, mental health problems could have devastating effects.

In their report, Adi *et al* (2007) discussed the mortality and morbidity consequences associated with childhood and adolescent mental health disorders. They noted that mental health disorders increase the risk of head injuries, getting burns, fractures, bed wetting, coordination problems, and speech problems. There is a growing body of evidence which suggests that young people with mental problems are more likely to have physical health complications (Seymour, 2003; Phelan *et al.,* 2001). However some of these health complications may be due to the socio-economic factors associated with mental health problems e.g. deprivation and homelessness.

Literature indicates that mental health problems in childhood may predict mental illness in later life (Caspi, 1996; Robins and Price 1991; WHO, 2005). In their study, Robins and Price (1991) found that conduct disorder in childhood predicted ten mental illnesses in adulthood including: compulsive disorder, depression, and others. In another study by Caspi (1996) about behavioural observations at age three predicting adult psychiatric disorders, children who were not fully controlled at the age of three years were more likely to develop a range of mental problems such as antisocial personality disorder and violence at the age of 21years; children who were inhibited were more likely to commit suicide at the age of 21 years. Kessler *et al* (2005) studied 9,282 people aged 18 years and above in the USA who had a diagnosable mental problem; 50% of the people had been diagnosed with a mental problem by the age of 14 years. These findings were similar to those of a study conducted in New Zealand by Kim-Cohen *et al* (2005) who found that 50% of their sample had been diagnosed with a mental problem between the age of 11 and 15 year. Kandel (1986) showed that depressive symptoms in childhood were important predictors of depression, psychiatric hospitalisation, smoking, drug use, and troubled sexual relationships in adulthood. To this end, Kim-Cohen *et al* (2003) suggested that administering effective treatment for mental problems to children could prevent 50% of the adult prevalence of mental problems. Zimmerman *et al* (1997) were able to show that high self-esteem among adolescents was a protective factor against alcohol abuse and failure in school in later life.

The National Service Framework for Children, Young people and Maternity Services in England identified that mental health problems could have far reaching implications on the lifelong outcomes for children and younger people. They noted that the most obvious would be: failure in education, family breakdown, disability,

defiance and anti-social behaviours, exploiting social services including schools, health and justice systems (Department of Health, 2004).

Green *et al* (2005) reported that data from the 2004 ONS survey indicated that over 44% of children with emotional disorders were always behind in intellectual development compared to their normal peers, these children were also two times more likely to have special educational needs and were more likely to be absent from school. These factors directly impact on their ability to learn which puts them on a disadvantage in terms of academic achievement. This disadvantage extends even in employment; by 2007 it was only 1 in 5 people with a mental disability that got a job (Sainsbury Centre for Mental Health, 2007). Today, employers emphasise social and emotional skills e.g. ability to communicate well, ability to work in a team (Mental Health Foundation, 2008); since people with mental problems are known to be lacking in these skills, it becomes quite unlikely that it would be easy for them to get into employment. Power *et al* (1991) showed that depressive symptoms in childhood were an important predictor of unemployment in adulthood.

The Prison Reform Trust (2008) reported that young people with mental health problems are more likely to be drug and alcohol addicts, which makes them perpetual offenders. This does not only waste their valuable time in years spent in prison, it has the potential to ruin their lives and make them useless in society, imposing an enormous burden on social and economic resources (Carter, 2007). Furthermore, young people with mental health problems are more likely to become homeless. The Mental Health Foundation (2006) report identified that most homeless young people had a mental health problem. Although it could be argued that these mental health problems develop due to being homeless (consequence), there is evidence to suggest that instead mental health problems are often causal and implicated in circumstances that make young people run away from home, thus becoming homeless.

Children with conduct disorders were shown to be more likely to engage in unprotected sex, crimes and dangerous driving habits (Caspi *et al.,* 1995); they are neither able to initiate and sustain supportive relationships in adult life (Quinton *et al.,* 1993) nor able to engage in helpful social support networks that would protect them against negative health outcomes (Morgan, 2004). The next section explores child mental health in relation to other socio-aspects.

2.8.7 Socio-aspects and child mental health

Children live in societies whose dynamics, norms and cultures have a significant role in either exacerbating the risk of developing mental health problems or protecting against it. In light of this, developing effective intervention programmes for child mental health must be rooted in strengthening the societies and communities in which children live by increasing social support and inclusion, reducing socio-economic disparities, promoting peer and friendship networks, ensuring safety in the neighbourhoods of children, and effectively dealing with discrimination and stigma (Morgan *et al.,* 2007).

Family support particularly communication at home has been identified to be important in enhancing mental wellbeing among children (Morgan *et al.,* 2007). Pedersen *et al* (2004) showed a significant positive association between better communication with mothers and fathers and perceived health among children. Zambon *et al* (2006) argued that this association tends to decline as the children grow older. Molcho *et al* (2007) investigating relationships among Irish children found evidence to support the relationship between good communication with parents and high levels of life satisfaction, happiness and reduced complaints.

School support has also been identified as an important factor that could enhance mental wellbeing among children. There is evidence to suggest that children who have positive school experiences are more likely to perceive their health as being good as well as report being highly satisfied with life. Positive school experiences could come from good relations with peers, perceptions of good performance at school, good relations with teachers etc. (Morgan *et al.,* 2007; Ravens-Sieberer, 2008).

Peer relations are also a very important aspect in terms of children's mental wellbeing. Being loved and accepted by friends is an important factor in the healthy development of children. Banerjee and Dittmar (2008) showed that children who were less integrated in peer groups were more likely to have emotional problems. Hymel *et al* (1990) reported that a significant association between peer social support and levels of anxiety and depression existed.

Although the above mentioned factors can enhance mental well-being in children, their impact can be buffered by socio-economic disparities in society. Children living in deprived conditions are more likely to face risk factors for developing mental

health problems. There is evidence to suggest that lower socio-economic status is associated with lower mental wellbeing among children (Morgan *et al.,* 2007). Graham (2004) noted that poor socio-economic conditions are associated with a number of stressing factors and challenges which may be difficult for children to negotiate. It is these stressors and challenges that begin to impact on the emotional wellbeing with the result that children become depressed, anxious and exhibit a whole range of psychological problems.

Despite the importance of socio-economic status in the mental wellbeing of children, defining this concept continues to be a subject for debate worldwide. Curie *et al* (2004) identified that the most appropriate and tested measure of socio-economic status is the Family Affluence Scale (FAS). Its concepts relate to the common indices of deprivation. It asks the following questions:

- Does your family own a van or a truck?
- Do you have your own bedroom for yourself?
- During the last 12 months, how many times did you travel away on holiday with your family?
- How many computers does your family own?

These questions are direct and they overcome the problems of obtaining unclear information from children about their parent's occupation and income levels.

But the interesting question to ask at this point is, what impact could the rising tide of childhood obesity have on the child mental wellbeing? Although there is not an obvious answer to this question, perhaps a glimpse can be caught in the section that follows.

2.8.8 Child mental wellbeing and childhood obesity

There is a growing body of research linking childhood obesity and mental wellbeing in children. A recent study by McCullough *et al* (2009) identified that obese and overweight children were more likely to experience poor mental wellbeing such as lower levels of self-esteem and self-perception. Puhl and Heuer (2010) showed that overweight and obese children are more likely to be stigmatised in society. Walker and Hill (2009) also posited a significant impact on the mental wellbeing of children, of being overweight or obese. However, most of the studies investigating the association between mental health and weight problems are limited by the inability to indicate causation. Consequently, the direction of causality between mental

health and weight problems remains a subject for speculation. Serious debate has gone on, with one group of researchers and commentators suggesting that weight problems among children spark off poor mental wellbeing, while the other group maintains that poor mental wellbeing could spark off a whole range of eating disorders resulting into weight problems. In the absence of robust evidence, none of the two groups can argue their case with absolute certainty.

It would be sensible to argue that the starting point should be to identify mechanisms through which one aspect affects the other. For instance, one mechanism through which weight problems could impact on the mental health of children seems to be inadvertent through the effect of interventions such as surveillance and monitoring programmes for controlling weight problems. As already discussed above, one such programme – the NCMP, now involves routinely feeding back height and weight measurements of children to parents and their children. It is speculated that this activity could impact on the mental wellbeing of children. Box 2.3 presents key messages in this section.

Box 2.3 Summary of key messages regarding child mental health

- Child mental health problems increased significantly until the 1990s. However, this increase seems to have been stopped in the 21st century.
- Child mental health problems are thought to develop due to the interaction between biological, psychological and social factors.
- Child mental health problems profoundly affect society at both individual and society levels. Of particular importance, mental health problems in childhood have been shown to predict mental illness in adulthood.
- Mental health problems in children are increasingly being linked to childhood obesity, however, little is known about the direction of causality between these two important conditions
- It is speculated that interventions for combating childhood obesity such as the NCMP could inadvertently impact on the mental wellbeing of children.

Chapter 3 – METHODOLOGY

3.1 Introduction

This chapter details the methodologies used in the research. The theoretical assumptions underlying different research methodologies are critical; hence the need to examine the philosophical paradigms upon which the choice of methodological approaches for any study is based. The main paradigms namely positivism, interpretivism and pragmatism are presented herein. Emphasis in this chapter is put on mixed methods research, which is the approach used in the current study. Its historical perspectives, importance, issues and the challenges involved in its design are discussed, before exploring the justification for the choice of this approach in the current study.

3.2 Philosophical assumptions in research methodology

Research cannot be detached from the underlying philosophical assumptions about the nature of the world, interactions within it and how knowledge is achieved. Therefore there is a need to engage in some debate with the philosophical/theoretical assumptions underlying research methodology. The term methodology refers to the theoretical analysis of the methods or techniques used in any form of inquiry (Creswell *et al.,* 2003). Over the past decades, this term has often been used primarily as a substitute for the term methods; however research methodology is more than just a description of data collection tools used in a research study.

Methodology involves the philosophical assumptions and the rationale underpinning a particular approach taken in any inquiry. It identifies those ontological and epistemological ideologies upon which the researchers base a given study (Creswell and Clark, 2007; Creswell *et al.,* 2003). By definition, ontology is concerned with the nature of reality in the world (Gruber, 2008), while epistemology refers to the theory of knowledge (Dancy, 1985).

Over many centuries, various philosophical assumptions about the theoretical underpinnings of research methodology have evolved and these have been and/or continue to be debated strongly by researchers. Although there are many of these

philosophical assumptions, the current discussion will focus on only three, namely positivism, interpretivism and pragmatism.

3.2.1 Positivism as a philosophical paradigm for quantitative research

Positivism was developed at the start of the 19th century by Auguste Comte. Positivism assumes that the world is made up of facts that can be observed and measured and the main aim of research is therefore to describe the phenomena experienced (Tashakkori and Teddlie, 2003).

The ontological assumption of positivism is that there is a single objective social reality constant across different times and settings and that this reality is completely separate from the individual observing it. In terms of research based on positivist assumptions, this means that the researcher is completely separate from the object being researched (Weber, 2004). Positivism views science as the only way to discover reality in the world. It also holds the view that the world operates on the laws of cause and effect, and thus, by applying carefully the procedures of science, reality can be discovered and generalized to wider settings (Trochim, 2006).

The epistemological assumption of positivism is that knowledge of the reality that exists beyond the human mind can be built. Positivism assumes that the human experience of the world reflects the objective reality which forms the foundation for human knowledge (Weber, 2004).

Positivism and its philosophical assumptions form the theoretical basis on which quantitative research is based. As previously noted, research based on positivism assumes that the researcher is completely independent of the phenomena being researched. It also involves use of methods such as laboratory experiments; surveys etc, to collect large amounts of data which can be analysed using sophisticated statistical techniques to discover the underlying trends and causal relationships. It adopts a deductive approach, usually starting with a wider theory/hypothesis and testing it using measurements/observations of the subjects (Weber, 2004).

Positivism as the sole philosophy of science was supplanted soon after the Second World War by ‘post positivism’ which moved to acknowledge that the values of the researcher and the theory used have a major influence on research, and that the understanding of reality is subjective (Tashakkori and Teddlie, 2003). This opened

the door to discussion of a broader range of philosophical paradigms applied to research and these are discussed in the next section.

3.2.2 Interpretivism as a philosophical paradigm for qualitative research

Contrary to positivism, interpretivism assumes that reality in the world is socially constructed, it is complex and subject to change. It also assumes that the social world is basically different from the natural world and that the meanings individuals hold towards phenomena in the social world are mediated via perception/interpretation. Further to this, Interpretivists assume that meaning arises out of the interaction between individuals; thus accounts of human conduct are dependent upon language and description. Interpretivists hold the view that there is no external objective reality; thus any attempts to make the research process 'objective' are misguided (Weber, 2004).

The ontological assumption of interpretivism is that reality is inseparable from the individual observing it, and the epistemological assumption is that it is through social construction of the world that knowledge is built (Weber, 2004).

Interpretivism and its philosophical assumptions form the theoretical basis for qualitative research. Research based on interpretivism assumes that social reality is subjective, it therefore assumes a flexible approach to data collection. It makes use of methods such as ethnography, phenomenology, case studies etc. The main aim of research based on interpretivism is to understand peoples' experiences, feelings and beliefs as well as explanations. Researchers use smaller samples but collect rich subjective data, which they analyse using non-numerical techniques to generate understanding. An inductive approach is generally used starting with observations and attempting to build theory from them (Weber, 2004). A holistic approach is used to understand the influence of the social context on the phenomena being studied.

Researchers working in the positivist tradition have sometimes seemed to be at war with those working in a more interpretivist tradition. Recently however researchers have come to recognise the qualities of research based on the two traditions, and there is therefore an attempt to advocate for use of a mixed approach which combines both qualitative and quantitative approaches. Researchers advocating for the mixed methods approach have described 'pragmatism' as the philosophical paradigm for this approach, as the next section describes.

3.2.3 Pragmatism as a philosophical paradigm for mixed methods research

Pragmatism began to be discussed in research terms towards the end of the 19th century; it assumes that an ideology is true if it works satisfactorily. Pragmatism was first posited for use as the philosophical paradigm for mixed methods approach by Howe (1988). It is based on an assumption that both qualitative and quantitative methods are compatible; thus researchers can make use of both of these methods in their studies (Teddlie and Tashakkori, 2009). According to Morgan (2007), paradigm debates centring on ontological and epistemological assumptions should be completely disassociated with choice of methods in any inquiry. While positivism and interpretivism are deductive and inductive respectively, pragmatism is abductive; it combines deduction and induction. Thus, through induction, theories are generated and then tested through deduction. The pragmatic approach does not require the researcher to be either exclusively objective or subjective but rather intersubjective, meaning partly objective and partly subjective (Morgan, 2007). Pragmatism and its philosophical assumptions form the theoretical basis for mixed methods research. The section below discusses mixed methods research at length.

3.3 Mixed methods research

Obtaining a universally accepted definition for mixed methods research has been a subject for debate among researchers over the past decades. This dilemma has been due to the multitude of names different researchers have used to refer to this approach. In some instances, it has been referred to as blended research, integrative research, multimethod research, multiple methods research, triangulated research and in others mixed research (Hunter and Brewer, 2003; Johnson and Onwuegbuzie, 2004; Leech and Onwuegbuzie, 2009; Thomas, 2003; Johnson, 2007). However amidst all the controversy, mixed methods research is increasingly being accepted as the third methodological approach to research, and it continues to be considered to be independent of the traditional approaches (namely quantitative and qualitative research).

Analysing all the definitions of mixed methods research provided by the leading researchers in mixed methods research, Johnson *et al* (2007) have come up with the comprehensive definition for mixed methods research below:

> 'Mixed methods research is the type of research in which a researcher or team of researchers combine(s) elements of qualitative and quantitative research approaches (e.g. use of qualitative and quantitative viewpoints, data collection, analysis, inference techniques) for the broad purposes of

> breadth and depth of understanding and corroboration' (Johnson *et al.,* 2007).

Mixed methods research continues to go through various transitions since its inception as an approach for research. Consequently Johnson's definition is bound to change as the paradigm continues to develop. Any attempts to holistically understand the mixed methods approach should begin with tracing its historical routes, with a view to identify why in the first place it was developed.

3.3.1 Historical perspective of mixed methods research

Although the use of mixed methods approaches in research has become most wide spread in recent decades, it has a long standing history. For more than a century, some disciplines in the natural sciences such as palaeontology, geology, biology involved methods that would now be regarded as qualitative, due to their inductive approaches, naturalistic settings, detailed description and the intensive investigation of single cases. This is in contrast to the usual view of science methods as positivist, due to their experimental manipulation, control of extraneous factors, formal hypothesis testing and so on (Tashakkori and Teddlie, 2003).

During most of the 20th century, however, scientific research was dominated by quantitative methods. Researchers were expected to base their studies on objective measures as dictated by positivism, the dominant worldview at the time. However during the last two decades of the century, qualitative methodology emerged. It was seen as a reaction to the dominant quantitative methodology of the time and therefore it became widely popular among those who were not satisfied with quantitative methods. The qualitative approach promoted a more subjective approach to research (Tashakkori and Teddlie, 2003).

The popularity of qualitative research marked the beginning of a period of 'paradigm wars' in the history of research. This period was characterised by severe arguments and debates among researchers working in the two different traditions (quantitative and qualitative). These arguments and debates were always geared towards proving the superiority of one approach over the other and often involved use of derogatory language towards researchers in the opposite camps. In many ways advocates for quantitative methods saw these arguments and debates as a contest between clear-cut, refined techniques versus mere 'common sense'; while the advocates of qualitative methods saw the arguments as a contest between novel,

socially responsible methods versus adamantly old-fashioned and small-minded methods (Thomas, 2003).

Pressure to consider research in terms of this divide between qualitative and quantitative approaches has been based on the fact that both hold different ontological, epistemological and axiological assumptions (Brannen, 2005).

Out of these arguments amongst researchers in opposite camps, a new approach that was to become the present day 'mixed methods research' evolved (Jonhson *et al,* 2007). More specifically, the emergence of the mixed methods approach in research has been traced back to the 1960s, becoming more common in the 1980s a time during which 'paradigm wars' were intense. Through the 1990s advocates for the mixed methods approach incorporated other features such as the epistemological assumptions, paradigm theses, design, in addition to the methods (Tashakkori and teddlie, 1998).

It was Campbell and Fiske (1959) who first demonstrated the use of multiple research methods. Their work was expanded by many researchers including Denzin (1978) who first described how methods can be triangulated. He demonstrated four different methods of triangulation namely: data triangulation, method triangulation, researcher triangulation, and theory triangulation. He assumed that triangulation cancels out biases that may be due to a particular researcher, method or data collected. Other researchers (Greene *et al.,* 1989; Jick, 1979; Rossman and Wilson, 1985) identified reasons and justification for combining both qualitative and quantitative research.

The mixed methods approach has continued to grow in popularity among researchers. Most recently researchers have come to view both qualitative and quantitative methods as being potentially complementary rather than naturally antagonistic (Thomas, 2003); in fact there are more pressures and more support than ever before to consider bringing the two methods together into a mixed methods approach (Brannen, 2005). But the driving force behind this movement is the recognition of the importance of mixing methods discussed in the section below.

3.3.2 Importance of mixed methods research

The importance of the mixed methods approach is increasingly being recognised in research and its major strength lays in the fact that each strategy studies different aspects of a phenomenon. While the quantitative strategy studies the larger aspect

of a phenomenon, the qualitative strategy studies the micro aspects of the phenomenon. Thus combining the two approaches provides a holistic understanding of the phenomenon (Bryman, 2001). Thomas (2003) has concluded that the best answer usually comes from using both qualitative and quantitative methods in a mixed methods model. Moreover, Brannen (2008) notes that it has become increasingly common to reject the old fashioned debates about the relative advantages of one approach over the other, but instead debates highlighting the merits of combining the two approaches are widely commended.

Bryman (2001) identified the advantages of using a mixed methods approach. Table 3.1 demonstrates the advantages of using mixed methods research, identifying examples of studies in which each advantage is demonstrated.

Table 3.1 Advantages of using mixed methods research (Bryman, 2001)

Advantage of mixed methods research	Example of a study
• Mixed methods approach clearly satisfies the logic of triangulation. The results obtained using one strategy can be cross-checked against the results obtained using the other strategy.	• Demonstrated in the study by Hughes *et al* (1997) about consumption of designer drinks by young people.
• Qualitative research can lead to formulation of hypotheses that can be tested quantitatively.	• Demonstrated in the 1994 British National Survey of sexual attitudes and lifestyles (Johnson *et al.,* 1994).
• Mixed methods research is important in filling gaps especially in situations where the researcher cannot rely on either qualitative or quantitative methods alone.	• Demonstrated in the study of the Moonies cult by Barker (1984).
• Mixed methods research enables both the static and process features to be investigated.	• Best demonstrated in the study about mass consumption in Trinidad by Miller (1994)
• In mixed methods research, the qualitative part could reveal meanings of relationships between variables identified by the quantitative part.	• Demonstrated in the study about women receiving security benefits and fertility rates by Rank (1989)

Most recently Collins *et al* (2006) have confirmed four reasons for using mixed methods research and these include: participant enrichment, instrument fidelity, treatment integrity and significance enhancement. Of note, the strongest supporters of the qualitative paradigm have in recent years made statements that are supportive of the mixed methods approach (Johnson *et al*., 2007). It is largely due to the merits of the mixed methods approach being widely recognised by a multitude

of researchers that this approach was chosen for the current study, as Section 3.4 describes.

Although the mixed methods approach has recognised merits, significant challenges exist especially in the design of the study. Before considering these challenges, the next section will first discuss the approaches in designing mixed methods studies.

3.3.3 Designing mixed methods studies

Creswell *et al* (2003) defined the term study design as 'the procedure for collecting, analysing, and reporting research.' Considering mixed methods as a separate research design has always sparked debate among researchers; this is partly due to the lack of a universal definition for mixed methods that is recognised by all researchers as discussed in Section 3.3. But in designing mixed methods studies, Morse (2003) clearly puts it that, it is not a question of just combining strategies in a 'mix-and-match' style but rather 'methodological congruence' must be maintained with all the assumptions and components of each strategy carefully observed. A number of mixed methods designs have been suggested in various disciplines (Table 3.2 demonstrates mixed methods designs in nursing, public health education and health research disciplines).

Table 3.2 Classifications of mixed methods designs in various disciplines (Adapted from Creswell *et al.,* 2003)

Author	Mixed methods design	Discipline
Morgan (1998)	Complementary designs Qualitative preliminary Quantitative preliminary Qualitative follow-up Quantitative follow-up	Health research
Morse (1991)	Simultaneous triangulation QUAL + quan QUAN + qual Sequential triangulation QUAL → quan QUAN→ qual	Nursing
Steckler et al (1992)	Model 1: qualitative methods to develop quantitative measures Model 2: qualitative methods to embellish quantitative findings Model 3: qualitative methods to explain quantitative findings Model 4: qualitative and quantitative methods used equally and parallel	Public health education

Distinguishing between the various designs is important in determining which one to use in a study. Over the past few decades, four criteria have been developed to provide guidance to researchers towards identifying the type of mixed methods design they may use in any particular study (Creswell *et al.,* 2003). These criteria are described below.

i) Implementation of data collection

This involves the sequence used to collect both the qualitative and quantitative data. Whether in a mixed methods study qualitative data should be collected first or vice versa is an issue that has been debated by several authors yet no resolution seems to be reached (Creswell *et al.,* 2003; Morgan *et al.,* 1998; Morse, 1991). However amidst all these debates is a universal suggestion that there are two main options through which implementation of data collection is done. Data can either be collected 'concurrently' or 'sequentially'. Concurrent data collection involves collecting both qualitative and quantitative data at the same time while sequential data collection involves collecting the information in phases with either qualitative or quantitative data collected first depending on the objectives of the study (Creswell *et al.,* 2003). If the researcher intends first to explore the problem with a large sample and then later to obtain an in-depth understanding of the problem with a smaller sample, then quantitative data collection is done first followed by qualitative data collection. However if the researcher intends to first explore the problem in greater depth with a small sample before exploring the problem with a large sample to obtain results that can be generalised to a larger population, then qualitative data collection precedes quantitative data collection (Creswell *et al.,* 2003). The existence of two phases of data collection mean that the researcher has to report the procedures of data collection in separate phases, later on integrating the two in the discussion and conclusion sections of the study.

ii) Priority given to an approach in the mixed methods study

Morgan (1998) discussed the difficulty in choosing which approach, of the qualitative and quantitative methods, should be given priority in a mixed methods study. Creswell (2009) argued that priority given to a particular approach would affect the entire research process including the purpose of the study, the literature review, the data collection methods, the data analysis methods and the interpretations of results. There are three options from which the researcher can choose: giving equal priority to both qualitative and quantitative methods, and emphasising quantitative methods more than qualitative methods or emphasizing qualitative methods more than quantitative methods. But this choice is dependent on various factors such as practicalities of data collection, the target audience and the expertise of the

researcher (Creswell *et al.*, 2003). Researchers need to put particular emphasis on the weight given to an approach in mixed methods research and provide justification for their choice.

iii) Stage of integration of the approaches

Integration refers to the process of combining both qualitative and quantitative approaches in a particular stage of a study. Tashakkori and Teddlie (1998) emphasised the importance of identifying the stage at which the two approaches are integrated in a mixed methods study. Creswell *et al* (2003) argue that integration of the two approaches can occur at any stage of the research process, for instance while defining the purpose of the study both the qualitative and quantitative questions may be presented; during data collection open-ended questions may be included in a structured questionnaire, and during data analysis, qualitative themes may be converted into scales. Studies using the mixed methods approach need to be designed with a clear understanding of the stages at which the approaches are to be integrated, keeping in mind the fact that the decision on the stage of integration is dependent on the aim of the study, the ease with which integration can be done and the expertise of the researcher.

iv) Theoretical perspectives

Theoretical perspectives are the personal views that researchers hold towards the study that is being conducted. These may be influenced by culture, religion, race, gender and social class. Creswell (2009) argues that these are very important aspects to consider while conducting mixed methods research. Greene and Caracelli (1997) first discussed the importance of incorporating theoretical perspectives in mixed methods research through transformative designs. These designs are informed by theoretical issues like gender, race, social class, and feminism.

Based on the four criteria discussed above, Creswell *et al* (2003) described six major mixed methods study designs which are presented in Table 3.3.

Table 3.3 Mixed methods designs by four criteria (Adapted from Creswell *et al.,* 2003)

No	Design type	Implementation	Priority	Stage of integration	Theoretical perspective
1	**Sequential explanatory**	Quantitative followed by qualitative	Usually quantitative; can be qualitative or equal	Interpretation phase	May be present
2	**Sequential exploratory**	Qualitative followed by quantitative	Usually qualitative; can be quantitative or equal	Interpretation phase	May be present
3	**Sequential transformative**	Either quantitative followed by qualitative or qualitative followed by quantitative	Quantitative, qualitative or equal	Interpretation phase	Definitely present (conceptual framework, advocacy, empowerment)
4	**Concurrent triangulation**	Concurrent collection of quantitative and qualitative data	Preferably equal; can be quantitative or qualitative	Interpretation phase or analysis phase	May be present
5	**Concurrent nested**	Concurrent collection of quantitative and qualitative data	Quantitative or qualitative	Analysis phase	May be present
6	**Concurrent transformative**	Concurrent collection of quantitative and qualitative data	Quantitative, qualitative, or equal	Usually analysis phase; can be during interpretation phase	Definitely present (i.e. conceptual framework, advocacy, empowerment)

Of the six mixed methods designs in the table above, the most straightforward is the sequential explanatory design. In this method, quantitative data is collected and analysed first, then qualitative data is collected and analysed next. Usually priority is given to the quantitative approach and integration occurs mainly in the discussion and conclusion section of the study (Creswell *et al.,* 2003). The current study was based on this design, but the priority given to the two approaches was equal.

Although mixed methods research has progressed in recent decades, there still remain significant unresolved issues as far as this approach is concerned (Devine and Heath, 1999). The section below describes the challenges in mixed methods research.

3.3.4 Challenges in mixed methods research

Despite the merits of mixed methods research (described in Section 3.3.2), researchers advocating for mixed methods research have been faced with the challenge of disproving the incompatibility thesis which was proposed by the 'paradigm purists'(Teddlie and Tashakkori, 2003). The incompatibility thesis suggests that qualitative and quantitative approaches can never be compatible since they are based on separate paradigms. Advocates for this thesis further suggest that researchers combining these approaches are 'doomed to failure' as a result of the underlying differences in the two approaches (Teddlie and Tashakkori, 2003). However this thesis has been criticised heavily; Greene *et al* (1989) showed that the mixed methods approach had been extensively used in over 57 studies which were successful.

Brannen (2003), Morgan (1998) and Bryman (2001) identified four possible outcomes when methods are combined including:

- Corroboration where similar results are derived from both qualitative and quantitative methods.
- Elaboration where the qualitative results provide an example of how the quantitative findings would apply in a given situation.
- Complementarity where the findings from quantitative data differ from those in the qualitative data but both are insightful.
- Contradiction where the findings from the qualitative data contradict those from the quantitative data.

They argued that significant challenges arise in making sense of data emerging from different methods, especially when the qualitative data does not either confirm or challenge the quantitative data. Devine and Heath (1999) also noted that important questions arise as to how the research would reconcile contradictory data or which criteria would be used either to discard or to include some of the data.

Mixed methods approaches thus require high level decision making regarding how to deal with contradictions between data sets, as well as considering whether or not to make one approach more superior over the other for the sake of proper analysis and interpretation of the findings (Devine and Heath, 1999). That said, these

challenges do not outweigh the advantages in using mixed methods to study complex phenomena which further provides a justification for the choice of the mixed methods approach in this study, as the next section describes.

3.4 Justification for use of mixed methods approach in the current study

The research aims and objectives indicated both a need to look cross sectionally within the sample population of 10 – 11 year olds to ascertain relationships between weight status and various other factors, but also to 'dig deep' within individual cases to explore the process of response to the NCMP intervention. It was therefore strongly thought that the mixed methods approach would be the best for use in the current study.

Use of this approach meant that both quantitative and qualitative methods were used together in the study. The quantitative part of the study involved a school based survey collecting data on weight status and mental wellbeing of a large sample of children in order to investigate the association between the two variables among children. The qualitative part of the study involved one-to-one semi-structured interviews with a smaller sample of children taken from the wider group which had completed the questionnaire. Also, face to face interviews were conducted with their parents/guardians in order to explore and therefore generate an in-depth understanding of the perceptions of children and their parents regarding weight status, mental wellbeing and school based monitoring programmes such as the NCMP (Marshall and Rossman, 2010).

Thomas (2003) argued that choice of the approach to use in any research largely depends on the questions that a particular research aims to answer. He further argued that in studies where the researcher seeks to make sense of, or interpret phenomena in terms of the meanings people bring to them, the qualitative approach would be the most ideal; whereas for studies where the researcher seeks explanations and predictions that would generalise to other persons and places, the quantitative approach would be most ideal. By the nature of the research questions in the current study, it is quite clear that there would be need to generalise the association between mental wellbeing and weight status to wider child populations (thus demanding quantitative methods), but at the same time the need to explore the meanings children and their parents bring to child weight status, mental wellbeing and school based monitoring programmes such as the NCMP was paramount, thus justifying the need for qualitative methods.

Having considered the theoretical underpinnings of the methodology used in the study, it is important to describe the tools and techniques used in data collection and analysis in this study and this is the central focus for the next chapter.

Chapter 4 – METHODS

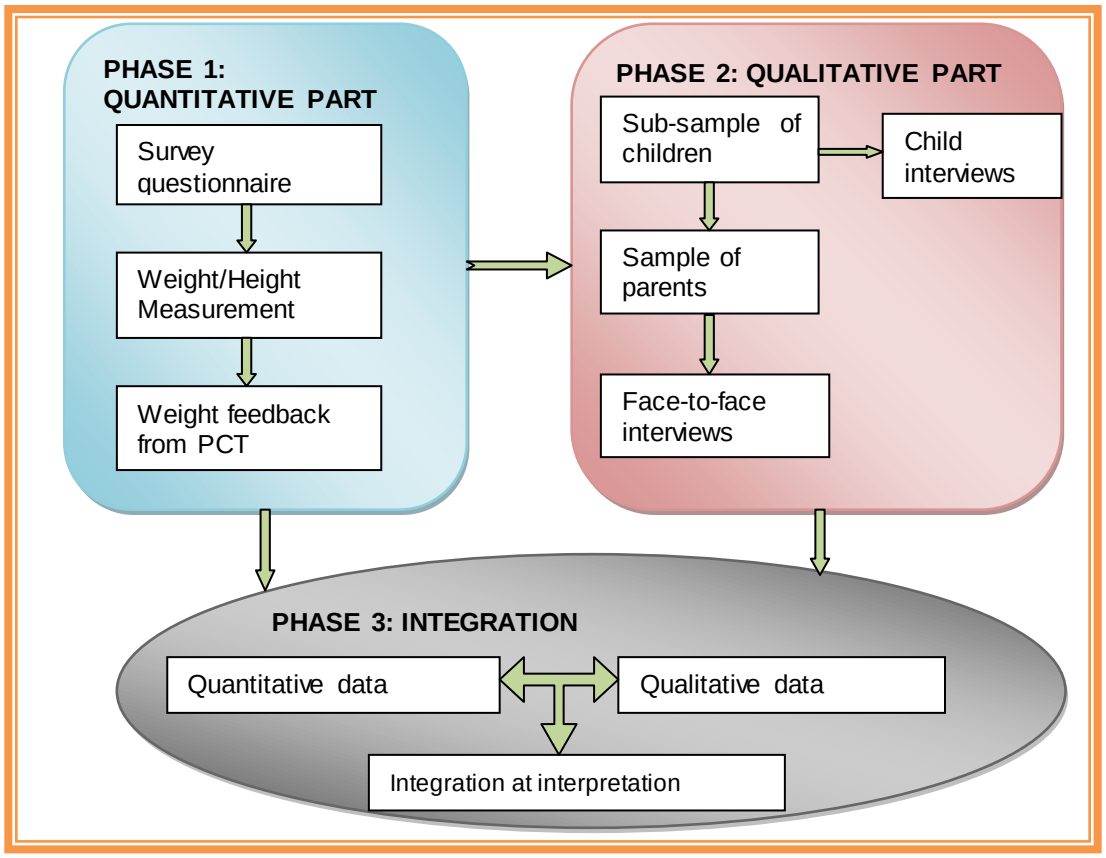
4.1 Introduction

This section presents the methods that were used in the study. First the study is described in terms of the design, site and sampling population; this is followed by a concise discussion of the survey part of the study in terms of the study variables, sample size, sampling strategy, techniques of data collection, study procedures, data management strategies and data analysis. Later, the interview part of the study is described in similar terms as those considered in the survey study e.g. the sample size, sampling strategy and so on. The section concludes with a discussion of the ethical considerations considered in the study.

4.2 Study design

The overall study used a sequential explanatory mixed methods study design (described in Section 3.3.3) with the quantitative part of the study preceding the qualitative part. Figure 4.1 demonstrates the sequential explanatory design of the study.

Figure 4.1 The sequential explanatory design for the study



The design involves three phases namely: the quantitative, the qualitative and the integration phases. Quantitative data is collected first, followed by qualitative data with integration occurring at the interpretation phase.

4.3 Study site

The study was conducted in Gateshead PCT in the North East of England. The questionnaire survey and the child interviews were conducted within primary school settings, while parental/guardian interviews were conducted either in parents' own homes or in other places that were suitable for them. The North East of England has the lowest Gross Domestic Product (GDP) per head in England. Additionally, it has the highest rates of youth unemployment and teenage pregnancies in England. The North-East of England is one of the regions most severely affected by childhood obesity; the rate of increase in the prevalence of obesity in this region has been shown to be much higher than the national average (Ells *et al.,* 2010). This has made the North East of England an area of particular interest for research concerning childhood obesity, and provides the justification for the choice of this region to conduct the current study.

The North East of England is at the time of the study host to a number of PCT 'clusters'; Tees Valley, Durham and Darlington, South of Tyne and Wear (SOTW), Newcastle and Northumberland. Gateshead Primary Care Trust, where the study was conducted, is one of the PCTs found in the SOTW cluster. Figure 4.2 shows the location of the North East region on the map of England and Figure 4.3 identifies Gateshead PCT.

Figure 4.2 The North East of England on the Map of England (Adapted from One North East, 2011)

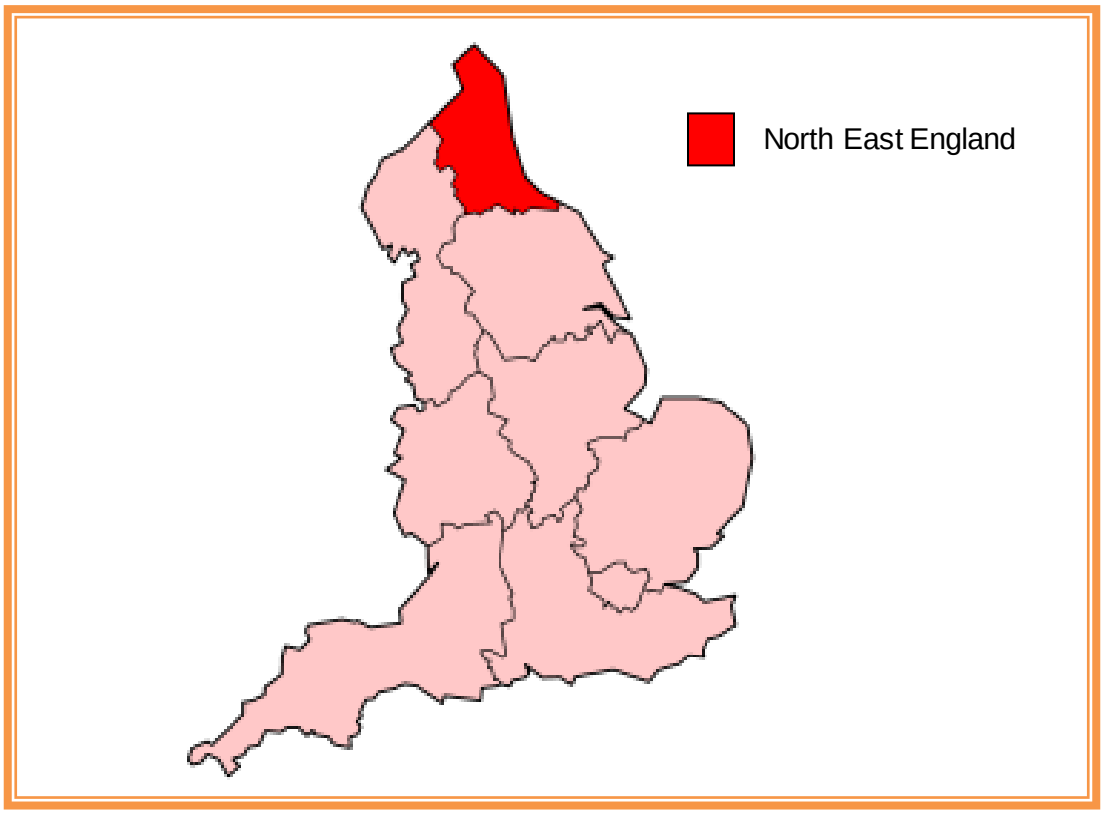
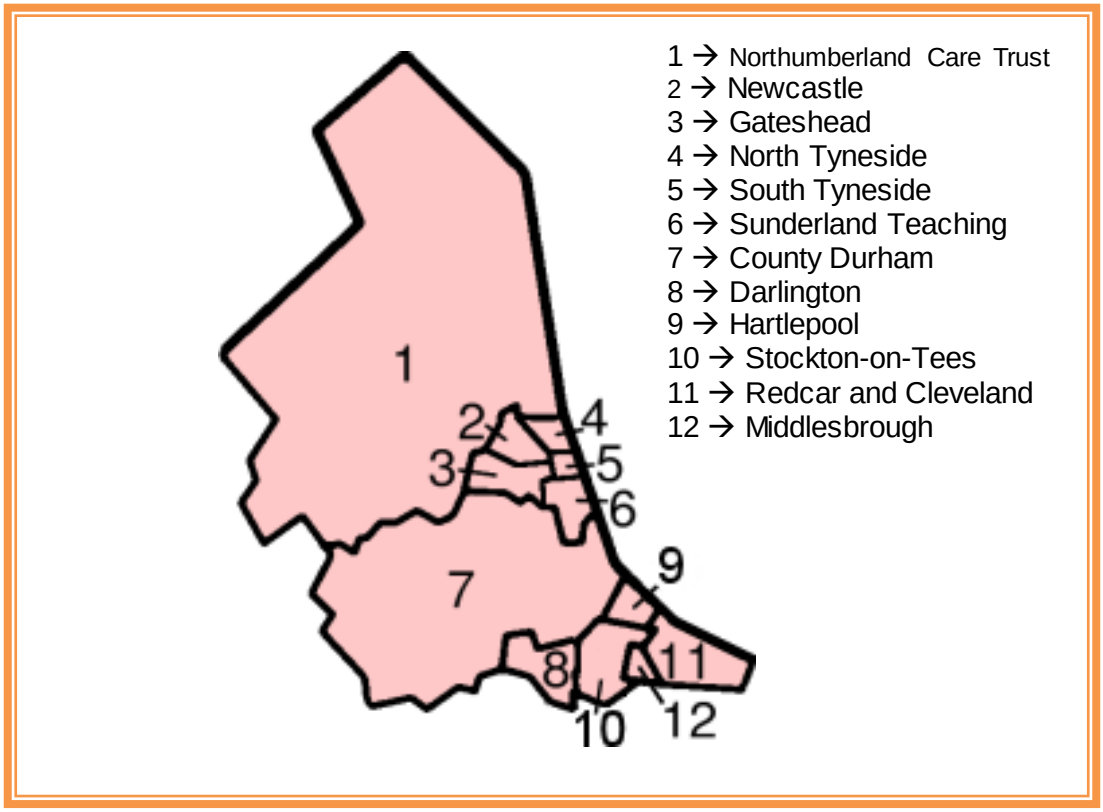


Figure 4.3 The location of Gateshead PCT on the Map of the North East (Adapted from One North East, 2011)



Gateshead PCT was specifically chosen as the site for this study because in 2008 it was the only PCT in the North East of England that had implemented the government's recommendation to routinely feedback the height and weight measurements obtained from the NCMP, to the parents and children.

Gateshead PCT has a total population of 191,000 individuals. Life expectancy in men and women is estimated to be lower than the national average (DH, 2011). Table 4.1 summarises the local health profile of Gateshead compared to the England average. Clearly, the demographic data for the area demonstrates higher levels of poverty and deprivation, together with all the public health problems associated with this.

Table 4.1 Local health profile of Gateshead compared to England average (Adapted from the Department of Health, 2011).

Indicator	Gateshead PCT	England Average	Range in England (percentage)
Deprivation	34.80%	19.90%	0.0 - 89.2
Children living in poverty	24.30%	20.90%	5.1 - 57
Homlessness	4.24%	1.86%	0.08 - 8.28
Long term unemployment	6.60%	6.20%	1 - 19.6
Physically active children	44.70%	55.10%	26.7 - 80.3
Obese children (year 6)	22.40%	18.70%	10.7 - 28.6
Teenage pregnancy (below 18 years	47.00%	40.20%	14.6 - 69.4
Healthy eating adults	19.90%	28.70%	19.3 - 47.8
Physically active adults	10.20%	11.50%	5.8 - 19.5
Obese adults	30.70%	24.20%	13.9 - 30.7
Drug misuse	11.50%	9.40%	1.8 - 23.8
Prevalence of diabetes	5.83%	5.40%	3.28 - 7.87
Life expectancy at birth for males	76.40%	78.30%	73.7 - 84.4
Life expectancy at birth for females	80.60%	82.30%	79.1 - 89
Infant deaths	5.20%	4.71%	0.68 - 10.63

The main study sample was selected from primary schools. Within the Gateshead PCT area there are 69 primary schools. If stratified according to deprivation status (using free school meals as a surrogate measure of poverty), 60% of the schools are in areas of high deprivation; 17% are in areas of moderate deprivation; while 23% are in areas of low deprivation. The average number of pupils in year six in

Gateshead schools is 30, with a number of schools running composite classes where children of different year groups are combined and taught together.

4.4 Study population

The target/theoretical population for this study was, all children aged between 10 years and 11 years in the UK. The accessible/study population from which the sample was drawn was a cohort of children aged between 10 years and 11 years in primary schools in Gateshead PCT. This age bracket was selected because it is the older of the two cohorts to which the NCMP is being applied (the other being reception). Children within this age bracket all over the UK were measured in the NCMP. Those in PCTs like Gateshead which had resources to implement the government's recommendation of routinely feeding back the height and weight measurements to parents and children, received their height and weight measurements along with comparator figures to identify the category of weight status to which they belonged. It was thought that this cohort (compared with the younger cohort aged 4-5 years old) had children old enough to complete the questionnaire and also to speak to the researcher in the interviews. Although an alternative would have been to gather information from either the teachers or parents of the children, this option was regarded inferior to gathering it from the children themselves, since evidence has shown that parents and teachers may not know their children well enough to represent their feelings accurately (Morgan *et al.,* 2008). However, in order to collect a rich qualitative data set and to triangulate some of the accounts of children, a small sample of parents/guardians were also asked to participate in the one-to-one semi-structured interviews. Therefore the secondary participants for the study were parents/guardians of children who participated in the child interviews.

4.5 The survey study

4.5.1 Study variables

The survey study involved collecting continuous and discrete data on a number of variables some of which were dependent while others were independent. The dependent variables included child BMI (an indicator of weight status), total difficulties score (an indicator of mental wellbeing), emotional symptoms score, conduct problems score, hyper activity score, peer problems score, pro-social behaviour score, the General Health Questionnaire score (Indicator of mental wellbeing), life satisfaction score and self-assessed level of physical activity.

Independent variables included child age, gender, family affluence, society support score, school support, dietary habits, highest level of parental education, and ethnic background.

4.5.2 Sample size

The quantitative part of the study involved a total sample of 264 primary school children of whom 146 (55.3%) were girls and 118 (44.7%) boys. To estimate the sample size required for the study, the study was taken to be two tailed, and the Pearson correlation coefficient – R, was used to estimate the effect size. Since literature does not suggest a theoretical correlation coefficient – r, between BMI and mental wellbeing of school children, an assumption of a moderate correlation between these two variables was taken and thus the conventional Pearson correlation coefficient, R = 0.2 for moderate effect size was used in the calculation of the sample size. A statistical significance level, $\alpha = 0.05$, was also assumed, suggesting that a 5% risk of rejecting the null hypothesis when in fact it is true, was to be accepted. The power of the study used in estimating the sample was assumed to be 90%, also suggesting that there was only a 1 in 10 chances that the true effect would be missed. Feeding the above figures into the program for sample size calculation, G-power, a total sample size of 191 analysable subjects appeared to be desirable. It was necessary to sample more than 191 participants since it was assumed that some participants would drop out.

4.5.3 Sampling procedure

The basic sampling units around which the sampling procedure was planned were the primary schools in Gateshead PCT catchment area. The sampling frame was therefore the list of all primary schools in Gateshead PCT. Once a school was selected, all children aged 10 years and 11 years were approached and asked to take part in the study. Participating schools were selected using a proportionate stratified random sampling technique. Because weight status, a key independent variable, has been linked to social class (Zambon *et al*., 2006), schools were classified according to deprivation status using percentage of children on free school meals in a school as a surrogate measure of poverty. First steps involved obtaining a list of all the primary schools in the Gateshead PCT (sampling frame) together with the information on percentages of children in receipt of free school meals. The comprehensive list of all primary schools was obtained from the official website of Gateshead council (http://www.gateshead.gov.uk), while information on percentage of children on free school meals was obtained from the Office for Standards in

Education, Children's Services and Skills (Ofsted) reports for every school, also obtained online from the official Ofsted website (http://www.ofsted.gov.uk). In these reports, the percentage of children on free school meals was given and this was classed as either 'above national average', 'below national average' or 'average'. These classes were used to categorise schools as highly deprived if the percentage of children on free school meals was above national average, moderately deprived if the percentage was average and less deprived if the percentage was below the national average. In order to obtain the actual participants in each of the strata, a three stage procedure described in the sections below was followed.

4.5.3.1 Selecting schools

In order to obtain the number of schools that were needed to get the required sample of 264 participants, it was necessary to estimate the average number of children aged 10 years to 11 years in schools in Gateshead. This was done by assuming that children of this age group would be in year six, and then enrolment numbers of the year six children in all the schools were obtained online. A response rate of 35% per school was assumed; meaning that out of the 30 children per school, only 11 would be likely to take part in the study. It was therefore assumed that in every participating school a minimum number of 11 children would be obtained. Since the total number of children needed was 264, a total of 24 schools were needed in order to obtain the required sample.

The next task was to identify the number of schools that would be sampled in each of the strata of deprivation. In order to allow equal chances for every primary school in the sampling frame to be selected, a sampling fraction was calculated by dividing the required number of schools by the total number of eligible schools in the sampling frame. Although there were 69 primary schools in Gateshead, 3 of them were special schools and so they did not meet the eligibility criteria for the NCMP and so they were excluded from the sampling frame; thus the sampling fraction was calculated as 24/66 = 0.36. The sampling fraction was then multiplied by the total number of schools in each stratum to obtain the number of schools that would be sampled in each strata of deprivation as demonstrated by Table 4.2.

Table 4.2 The number of schools sampled in each stratum of deprivation

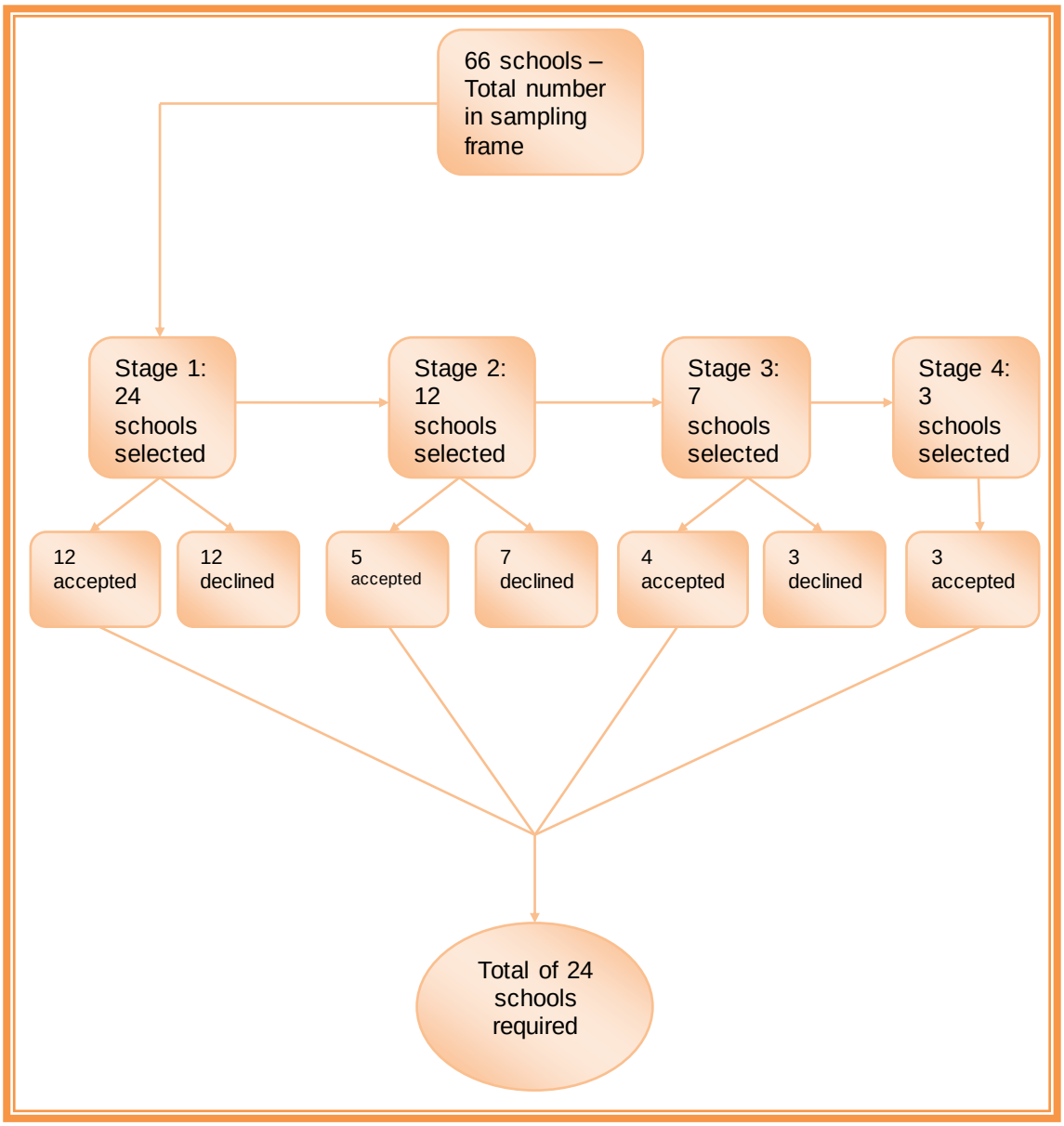
Category of deprivation	Number of schools in each stratum	Multiplied by similar sample fraction	Number of schools sampled	Approximate number of children in each stratum
High Deprivation	39	39 X 24/66	14	14 X 11 = 154
Moderate deprivation	12	12 X 24/66	4	4 X 11 = 44
Low deprivation	15	15 X 24/66	6	6 X 11 = 66

The schools in each category were then randomly selected using tables of random numbers. In the high deprivation category, the schools were arranged alphabetically and then given numbers from one to 39. A starting point within the table of random numbers was randomly chosen and moving from left to right, any numbers that fell within the range of 1 to 39 were selected until 14 numbers were selected. Those schools that corresponded to these numbers were taken into the sample. This procedure was repeated with schools in the moderate and low deprivation categories, except that the numbers chosen ranged between one to 12 and one to 15 respectively, until the required number for each category were chosen. The selected schools were then contacted for permission to take part in the study as described in the study procedure in Section 4.5.4. Actual selection of the participants is described in the sections that follow.

4.5.3.2 Selecting individual children for participation in the quantitative phase

Once agreement to participate was obtained from the head teachers of the selected schools, all children aged between 10 years and 11 years who met the inclusion criteria were invited to take part. Children were recruited into the study provided they had assented and their parents/guardians had given consent. At this stage random selection of the children was not done in order to avoid causing annoyance to those children who would have wanted to take part in the study but were not chosen by the process of random selection. If a school declined to take part, the random selection process would be repeated to replace it. Figure 4.4 shows a flow of the stages in which the required sample of schools was obtained.

Figure 4.4 Flow of stages for sampling schools taking part in the study



It was hoped that a stratified random sample collected in this way would yield children in each of five categories of weight status, namely: underweight, ideal weight, at risk of overweight, overweight and very overweight.

4.5.4 Inclusion and exclusion criteria

Children were included in the study only if their parents/guardians had consented to them being measured in the NCMP and were excluded if they had physical disabilities or learning difficulties in accordance with the NCMP exclusion criteria.

4.5.5 Study procedure

First steps involved obtaining ethical approval from the Teesside University School of Health and Social Care Research Governance and Ethics Committee, to conduct

the study (appendix 9). When this was granted, the selected schools were sent an information pack containing an invitation letter and the school information sheet addressed to the head teacher, followed up one week later with a phone call to answer any queries that the school might have about the project, and to ask for verbal consent of the head teacher for the school to take part in the study. When a school declined to take part it was immediately replaced using the same procedure for selecting schools. However when a school accepted, I visited the school to explain the study, answer questions and give out the information packs for the children to take home to their parents/guardians. This information pack involved an invitation letter to the parent/guardian, a parent/guardian information sheet explicitly explaining the aims and objectives of the study and the procedures of the study (appendix 6), a child information sheet for the children to read more about the study (appendix 2), the parent/guardian consent form (appendix 4) and the child assent form (appendix 3). On the day of the visit, an attractive poster summarising the aims and activities of the study was pinned up in the classroom of the children (appendix 8). This was aimed at ensuring that children did not assent to participating in a study they did not understand fully. This poster aimed to provide a further opportunity for children to assimilate what the study was actually aiming to achieve. Only those children who had both parental consent and child assent forms returned to school and met the inclusion criteria were recruited into the study.

Upon recruitment, an appointment was set up for the children to complete the questionnaire at school. On the day of completing the questionnaire, recruited children were taken out of class to a private room. There, they were given instructions regarding completing the questionnaire, it was emphasised that the questionnaire was not a test; neither did it have right or wrong answers. Children were asked to attempt items based on their own experiences and situation and not on that of their friends. They were also re-assured that no-one other than the researcher and his supervisors would get to see their answers; as such they were encouraged to be as honest as possible.

Later, at some point in the academic year 2009 – 2010, children participated in the NCMP where they were weighed and measured by the school nurse and parents/guardians subsequently received their child's weight status measurements (feedback) from Gateshead PCT. Soon after receiving the weight feedback from the PCT, schools were revisited by the researcher and children were given a pack containing the demographic data collection form (appendix 7) to take home to their

parents. On this form, parents were asked to write the weight and height measurements they had received as feedback from the PCT.

Quantitative data from children was collected using a school-based self-report questionnaire (appendix 1), while that from parents/guardians was collected using a demographic data collection form (appendix 7). Each of these methods has been fully described in the sections that follow.

4.5.6 Methods of data collection – the school-based self-report questionnaire

The school-based self-report questionnaire was used mainly to measure the mental wellbeing of children together with gathering other biographical details and other information on lifestyles and general interests. This questionnaire was developed by combining two standard scales for measuring mental wellbeing in children and then augmenting them with a small number of other questions enquiring about biographical details, eating habits, levels of physical activity and other general interests. The two standard scales included the self-completion Strengths and Difficulties Questionnaire (SDQ) and the 12 item General Health Questionnaire (GHQ-12) which are standard tools for measuring mental health status of children aged between 11-16 years (Goodman, 1997). These are described in the next sections.

4.5.6.1 The Strength and Difficulties Questionnaire (SDQ)

The SDQ is a 25-item behaviour screening questionnaire that investigates the positive and negative mental wellbeing attributes of children aged between 3 and 16 years. The 25 items of the SDQ are grouped into five domains representing the contemporary psychological problems of children and youth today (Table 4.3). Each of these domains is investigated by five items to which children are required to tick one of the responses namely: ‘not true’ ‘somewhat true’ and ‘certainly true’. These responses are scored ranging from 0 to 2 using a standard scoring system to generate total scores for each domain. The scores for the first four domains are added up to generate the total difficulties score (an indicator of mental wellbeing). For each of the domains, standard cut off points are used to categorise the children as ‘normal’ ‘borderline’ or ‘abnormal’, as demonstrated in Table 4.3.

Table 4.3 The cut off points to generate categories of mental wellbeing in children

Domain	Normal	Borderline	Abnormal
Total Difficulties Score	0-15	16-19	20-40
Emotional Symptoms Score	0-5	6	7-10
Conduct Problems Score	0-3	4	5-10
Hyperactivity Score	0-5	6	7-10
Peer Problems Score	0-3	4-5	6-10
Prosocial Behaviour Score	6-10	5	0-4

The SDQ has several versions namely: the parent SDQ, the teacher SDQ completed; and the self-completion SDQ completed by young people aged between 11 years and 16 years. Although the self-report SDQ was intended for children aged between 11 and 16 years, Muris *et al* (2004) attempted to identify the validity of the psychometric properties of this instrument on even younger children; they concluded that the SDQ-self report version could provide important information as far as mental health problems of children as young as eight years are concerned.

Having said that, it is important to address the key question as to whether there is any justification for use of the SDQ in this study. In the first place, the study population being children aged between 10 years and 11 years the instrument to be used had to be applicable to them, it had to consider both strength and difficulties as per the contemporary educational recommendations (Goodman, 1997). The instrument had to have proven psychometric properties and not be affected by the cultural background of the respondents, as the study population was to be undertaken from a culturally diverse sampling frame. Looking at the requirements, and considering all the available scales for measuring mental health in children (described in Chapter 2), the SDQ was found most fitting for use in the study. This instrument fits easily on one side of the A4 sheet of paper, making it easy to administer to the children. It takes into consideration the strengths and difficulties of the children as per the contemporary educational recommendations, and has a self-completion version which enables first-hand information to be obtained from children themselves (Goodman, 1997). Besides, the psychometric properties of the SDQ namely validity, reliability, internal consistency, sensitivity, specificity and the test re-test stability have been proven to be good (Goodman *et al.,* 2000; Goodman and Scott, 1999; Koskelainen *et al.,* 2001; Mathai *et al.,* 2004; Muris *et al* 2004).

When compared with the other available scales, the SDQ has still more advantages. Goodman (1997) conducted a study to compare the SDQ and the Rutter scales[3]; he found high correlation between scores of the SDQ and the Rutter questionnaire, and thus concluded that the validity and reliability of the SDQ were as satisfactory as those of the Rutter questionnaire. He further suggested that the functioning of the SDQ is as good as that of the Rutter scale but it offers many more advantages such as being compact (and thus easily applicable), considering both strengths and difficulties, covering aspects of peer relations, inattention and prosocial behaviours in a better way, as well as having a self-report version.

Further studies have confirmed that the validity and reliability of the SDQ are not different from those of long established scales such as the Achenbach scales and Rutter scales (Goodman and Scott, 1999; Koskelainen *et al.,* 2000; Mathai *et al.,* 2004). Goodman and Scott (1999) conducted a study to compare the SDQ and Achenbach's Child Behaviour Check List (CBCL)[4]. They concluded that the scores of the two instruments were highly correlated; both instruments could identify internalising and externalising behaviours properly; however the SDQ was better at identifying inattention and hyperactivity and its applicability was better than the CBCL due to the major difference in length. These findings were similar in other studies conducted in Germany and Finland (Klasen *et al.,* 2000; Koskelainen *et al.,* 2000). Comparing the SDQ with the other scales such as the SES, DASS, CES-D and MCSD, it has an advantage of measuring the general mental wellbeing of the children rather than measuring a single domain such as depression or anxiety. These other scales also have not been validated on younger populations, therefore their psychometric properties with younger children are not clearly known.

Of the three versions of the SDQ, the self-report has been chosen for use in this study because a study by Bettge *et al* (2002) showed that the self-report version of the SDQ was superior to the other versions in identifying mental problems of children. This same study also showed that the SDQ was more acceptable among the participants than the long CBCL.

[3] Developed in the early 1960, it consists of 26 items and has two versions A and B completed by parents and teachers (Koskelainen *et al.,* 2000).

[4] Developed recently by Achenbach, the Child Behaviour Check List has 118 items and it measures mental health in children.

Although the study by Goodman *et al* (2000) showed that the SDQ was poor at diagnosing children with specific phobias, anxiety and eating disorders, it still remains an instrument worth consideration for this study as the study is not aiming at diagnosing any of these specific disorders but rather aims to determine the general mental wellbeing of the children.

4.5.6.2 The General Health Questionnaire (GHQ)

This instrument developed by Goldberg in the 1970s as an instrument to detect minor mental illnesses among adults in the community (Donath, 2001) has now been validated for use in children. The instrument originally consisted of 60 items, all of which assessed normal functioning of individuals and the appearance of symptoms that could cause distress among people (Tait *et al.,* 2003). Over time, the GHQ has been shortened to yield other versions of 30, 28, 20 and 12 items (Montazeri *et al.,* 2003); these shorter versions have increasingly become preferred, compared to the longer versions, because they are easier to administer (Donath, 2001). The items of the GHQ ask participants to rate themselves, based on how much they feel they have experienced a particular symptom over the previous few weeks. Each item has four responses: 'better than usual', 'same as usual', 'less than usual', 'much less than usual' (Montazeri *et al.,* 2003). Different methods of scoring the GHQ items exist. In the current study, the standard one (known as the binary method) was used. This method is characterised as 0-0-1-1. In this the positive response to a symptom is given a score of 1 while the negative response is given a score of 0, then all scores for the various responses are summed up to generate a total score, thus for the GHQ-12, scores range from 0-12 (Donath, 2001).

The GHQ has been known to be highly sensitive, consistent, specific and reliable when used in community samples, more especially the GHQ-12 version (Montazeri *et al.,* 2003; Quek *et al.,* 2001). The validity of the GHQ in young samples was investigated on a sample of 200 young people aged 17 years and all versions of the GHQ were found to be highly valid in detecting non-psychotic mental problems (Banks, 1983).

Araya *et al* (1992) recommended the use of the GHQ as a quick and a less expensive way of obtaining information about psychological morbidity within populations. A recent study by Tait *et al* (2003) identified the GHQ (especially the 12-item version) as a good instrument for use on a young population due to its validity, brief nature (therefore easy to administer) and its capacity to identify a

range of negative emotional behaviours that influence the psychological state of young people.

But one question still remains: what is the justification for use of both the SDQ and the GHQ in the current study? In the first place, there has never been a robust study that compared the psychometric properties of both the SDQ and GHQ on child samples. Using the two scales together in this study could provide the first opportunity to identify the extent to which these two well established measures correlate in estimating mental wellbeing in children. Secondly it is thought that each scale would offset the disadvantages displayed by the other, thereby providing a rich data set short of weaknesses. A study by Goodman *et al* (2000) showed that the SDQ was poor at diagnosing children with some specific mental health problems such as anxiety yet the GHQ is known to be good at identifying some of these problems. On the other hand Lewis and Araya (1995) discussed the cultural bias of the GHQ. They argued that various responses to the GHQ items were highly influenced by cultural background of the respondents; thus they concluded that the GHQ is not a very useful instrument in studies that involve participants from populations with different cultural backgrounds. Also, Donath (2001) in her study on the validity of the 12-item GHQ in Australia, undertaken by analysing secondary data of the Australian National Survey of Health and Wellbeing of 1997, reported that the GHQ was not such a useful instrument in detecting mental health problems in Australia as compared to other countries. Winefield *et al* (1989) in their study on the reliability and validity of the GHQ in Australian youth populations found evidence to suggest that the GHQ was not useful in detecting mental health problems among the adolescents in Australia. Owing to these disadvantages, using it with another well-established measure would seem to be the most plausible option. It would enable maximum exploitation of its strengths, while providing control for any shortcomings. Also to date, there have not been many robust studies carried out to establish the validity of the GHQ in populations of younger children; much of what has been done is mainly with young adults.

4.5.6.3 Other questions investigating biographical details and lifestyles

Several other questions were combined with the SDQ and GHQ-12 to make a novel data collection tool. Most of the questions were extracted from standard questionnaires that had been already validated from Scottish and English surveys (Green et al., 2005; Gregory et al., 1995; Meltzer et al., 2000; McCullough *et al*., 2009; Morgan *et al.,* 2008). These questions investigated the socio-demographic

details and lifestyles of children, since these have been known to significantly impact on mental wellbeing of children. Consequently children were asked about the person they live with at home, the type of job their mother and father does, whether they own a car in the family and others (Green *et al.,* 2005). The questionnaire also involved some questions that investigated the eating habits of the children. Thus children were asked about how often they ate five portions of fruit and vegetables a day, how often they had fizzy drinks and so on (Gregory *et al.,* 1995). On a small scale, self-reported physical activity levels among children were investigated in this questionnaire by asking children how many hours they exercised vigorously, how often they rode a bicycle and so on (Morgan *et al.,* 2008). Self-perception was also investigated by asking children how they would describe their looks and how they would describe their weight status (McCullough *et al*., 2009). Reported weight and height was investigated by asking children to write down their weight either in kilograms or stones/pounds and their height either in metres or feet/inches. Children were also asked to comment on their experience in completing the questionnaire. Some of the items were arranged on a Likert scale where children were required to answer ranging from 'strongly agree' to 'strongly disagree'. Other items just required the children to tick the box corresponding to the most appropriate response in their circumstance.

Some questions were scored and combined to make composite scales. Responses on items 8, 9, 10 and 11 of the self-report questionnaire (Appendix 1) were scored and summed up to generate a new variable called the Family Affluence Score (FAS). For example item 8 ascertained if the child's family owned a car, van or truck, the responses were scored as follows: no = 0, yes (0ne) = 1, yes (two) = 2. In the same way, responses on items 15, 16, 17, 18 and 19 were scored and summed up to generate a new variable called Society Support Score (SSS). Responses on items 57, 58, 59 and 60 were also scored and summed up to generate another variable called the Feeding Habits Score (FHS). The same was done to the responses on items 66, 67, 68, and 69 to generate another variable called the Physical Activity Score (PAS). Likewise, responses on items 70, 71, 72, and 73 were scored and summed up to generate a new variable called Life Satisfaction Score (LSS)'. These scales were not validated however they were used to provide an indicative tool that would be useful for illuminating associations between variables.

In total the questionnaire had 75 items; clear instructions were included on the front page and at the start of every section. The questionnaire was broken down into four main sections namely biographical background information, the SDQ, the GHQ and lifestyle information. On average it took children 35 minutes to complete this questionnaire. Some puzzles were included at the end of the questionnaire, partly to make the experience of completing the questionnaire fun, but more importantly to keep those gifted children who worked through the questionnaire in a few minutes busy, so that they could not distract others who were slower. The questionnaire was designed with attractive illustrations to amuse children but these were carefully positioned in order not to interrupt the meanings of the various items. A copy of the questionnaire is attached as appendix one.

4.5.6.4 Pre-testing of the self-report questionnaire

Although the questions used in the questionnaire were obtained from standardised instruments, it was informally pre-tested on a small sample of children of colleagues working at Parkside West Offices at the Institute for Health and Social Care, Teesside University. The aim of the pre-test was not to establish the validity or reliability of the instrument but rather to establish the feasibility, applicability and acceptability of the questionnaire among children of this age group. Seven children, five of them girls, with a mean age of 11 years (SD = 1 year) volunteered to complete the questionnaire. Generally the questionnaire was found to be highly feasible, applicable and acceptable for use within this population. Adaptations were made on the instructions on the front page of the questionnaire to enhance clarity.

4.5.7 Methods of data collection – the demographic data collection form

The demographic data collection form was used to collect information about the parents/guardians of the children, and the height and weight figures/weight status received from the PCT. Parents/guardians of selected children were asked to volunteer/tender the height and weight figures of their child that they had received as feedback from Gateshead PCT. They were asked to write these figures on this data collection form that was sent to them shortly after receiving the NCMP feedback. This form involved questions on age, ethnicity, education, and occupation of the parents/guardians, as well as the height and weight figures received as feedback from the PCT.

4.5.8 Data management

All data collected as part of this study was managed in accordance with the Data Protection Act 1998. Access to the data and any study materials was restricted only

to the researcher and his supervisors. Upon completion of the project, all the data and study materials were archived in a secure way by the Teesside University and will be destroyed after six years.

Quantitative data was managed using the Statistical Package for Social Sciences Software (SPSS) version 16 - April 2008. In order to enter the data into this software, items on the questionnaire were first coded by providing them with variable names. Value labels for categorical variables were then determined and values for missing information were defined. Table 4.4 below shows part of the entire table for all the items of the questionnaire coded.

Table 4.4 The variable codes and value labels for categorical variables

Variable name	Variable label	Value labels for categorical variables	Missing values	Notes on how the data were collected
CID	Child identification number	None	None	Assigned
CAGE	Child Age in years	None	99	Calculated from the date of birth
CSEX	Child sex	0 Male 1 Female	9	Response on the questionnaire

Following entry into the software, data was cleaned and prepared for analysis.

4.5.9 Quality assurance

The findings from any analysis can potentially be distorted by the presence of wrong or inconsistent data. Errors and inconsistencies can arise at any stage of data processing and management, for instance the data entry stage, measurement stage etc (Hellerstein, 2008). It is therefore paramount that any database gets checked for errors and cleaned before analysis can be conducted.

Computers used were programmed to detect errors during data entry as a measure of quality control. This was aimed at minimising errors during data entry. Soon after data entry, simple exploratory data analysis tests that can detect any inconsistent or incorrect data entered into the software were run. These tests included: calculating the range for continuous variables, this could identify if the values of a variable were in the expected range. For categorical variables, tests for frequencies were run to identify the categories for each of the variables. The Kolmogorov-Smirnov test was conducted first to identify the normality of the distribution for continuous variables,

which enabled choice of either parametric or non-parametric tests to be selected for the analysis, depending on whether data was normal or skewed respectively.

4.5.10 Survey data analysis

The survey data set was analysed using SPSS software version 16. The entire analysis of the survey data was broken down into two categories, namely the descriptive statistics analysis and the inferential statistics analysis.

The descriptive statistics analysis aimed to summarise the data set in terms of the measures of central location and spread for continuous variables, and frequencies for categorical variables. Consequently statistics such as the mean, mode, median, standard deviation, range and percentiles were reported for the continuous variables, and percentages of the various categories were reported for the categorical variables. Distribution curves and histograms were generated for the continuous variables to identify the nature of distribution of these variables, and bar charts, pie charts and box plots were generated for the categorical variables. The socio-demographic characteristics of the sample were described first, because Miles and Huberman (1994) have argued that these set the background against which other conclusions can be based, and as such they need to be considered first in any analysis. Inferential statistical analysis aimed to identify relationships between variables using standard statistical tests.

The analysis was done in accordance with the objectives of the study. The first objective was to determine the weight status and mental wellbeing of selected 10-11 year old school children in the North-East of England prior to participation in the NCMP. This objective was achieved by asking parents to tender/volunteer the height and weight measurements that they had received as feedback from the PCT. This data was converted into BMI which was used as the indicator of weight status. To determine the mental wellbeing of children, SDQ and GHQ scores were computed, and children were categorised as normal, borderline, and abnormal using the standard cut off points.

The second objective was to identify the relationship between mental-wellbeing and weight status of school children aged 10-11 years. First scatter plots were drawn to identify the nature of the relationship between BMI (indicator of weight status) of the children and the total difficulties scores (indicator of mental wellbeing). The correlation and regression analysis was then carried out to identify the strength of the relationship, and the Pearson's correlation coefficient, r was tested at 5% levels

of significance in order to investigate whether or not the observed correlation was as a result of chance or due to a real effect. In this test the two-tailed null hypothesis that was being tested was, 'there is no significant relationship between mental wellbeing and weight status among 10-11 year old children'. It was assumed that weight status was the independent variable while mental wellbeing was the dependent variable. All the other factors were assumed to be constant. A Chi-square test was also conducted to identify the association between perceived weight status and categories of mental wellbeing among children.

The third objective was to identify other factors that impact on the weight status and mental wellbeing of school children. To achieve this, the influence of various factors on the weight status and mental wellbeing were tested using various statistical tests. For instance, the influence of gender on weight status of children was investigated using the Mann-Whitney *U* test. This was used to test whether median BMI was significantly different between boys and girls. This test was chosen because the independent variable (which in this case is gender) has got two categories, namely male and female, and the dependent variable (BMI) was skewed. When testing the difference in the median of a continuous variable between two categories of a binary variable, it is recommended to use the Mann-Whitney *U* test.

Through the analysis, participants were grouped according to gender, deprivation status and weight status and various sub-group analyses were done. These have been presented and discussed in Section 5.4. Potential confounders were stratified and mental well-being analysed in each of the strata to remove their effect on the conclusions of the study.

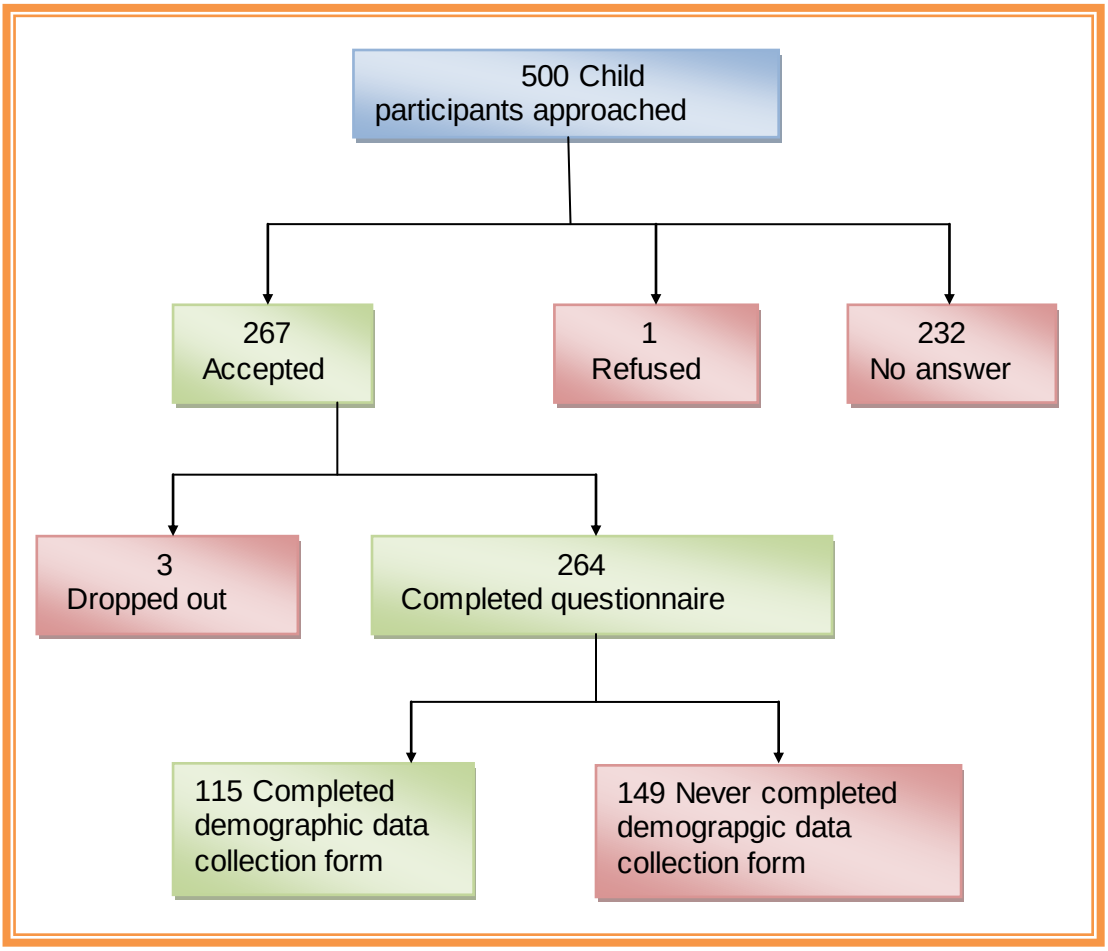
The other objective of the study was to investigate the correlation between the SDQ and GHQ in measuring mental wellbeing among children. This was achieved by drawing scatter plots between the SDQ scores and the GHQ scores to identify the extent to which the two measures are related. A correlation and regression analysis was conducted to test the significance of the relationship.

The sixth objective was to investigate the feelings, reactions and perceptions of children and parents about the National Child Measurement Programme and children's mental wellbeing. This was investigated by gathering qualitative data which is described in Section 4.6.

4.5.11 Response and attrition rates

Figure 4.5 shows the flow chart for the response and attrition of the participants in this study. At baseline, 500 eligible participants were approached for consent to take part in the questionnaire survey. Out of these 267 were eventually recruited into the survey with full consent, and this represents a participation rate of 53%. Out of this number 264 participants completed the questionnaire and 3 participants did not complete the questionnaire; at this stage this represented a dropout rate of 1%. The reason for the drop out of these participants was that they were absent from school; two were on holiday at the time of completing the questionnaire and one was sick. No examination was made of the characteristics of the children who had dropped out at this stage. The children who completed the questionnaire were later given a demographic data collection form. Out of the 264 participants, 115 participants returned the completed data collection forms. This represented a response rate of 44%, and an attrition rate of 56% respectively. The main reason for this attrition rate was the failure of the PCT to send feedback letters to these families showing the height and weight measurements before the end of the school term. Parents who had not received feedback letters from the NCMP were asked to hold onto the demographic data collection forms until they received the PCT letter. There was a small percentage of participants who had received the NCMP feedback but did not return the data collection form. An informal investigation of the characteristics of these participants mainly through conversations with school authorities revealed that most of these participants could have received feedback indicating that they were overweight and obese. Qualitative interviews conducted with parents revealed that most parents whose children had been labelled overweight and/or obese were upset and chose to hide the feedback letters away from their children. This could have been the reason why they did not complete the data collection forms with these results, assuming that somehow their children might see them. This issue is explored more fully in Chapter six where results of the qualitative interviews with parents are presented. Box 4.1 summarises the key messages from the survey study methods.

Figure 4.5 Flow of response and drop out of participants in the study



Box 4.1 Summary of key messages from the survey study methods

- The overall study used a sequential explanatory mixed methods design, with both qualitative and quantitative methods given equal priority.
- The study was conducted in primary schools in the Gateshead PCT catchment area. The study population was a cohort of children in year six (aged between 10 – 11 years old).
- The survey study involved a total sample of 264, children of whom 146 (55.3%) were girls. This sample size was based on power calculations.
- Participating schools were selected using a proportionate stratified random sampling method, using percentage of free school meals as a surrogate measure for catchment poverty.
- Survey data from children was collected using a self-report questionnaire which included two standard scales to measure mental wellbeing (the SDQ and the GHQ-12), along with other questions investigating biographical details and interests.
- Survey data from parents was collected using a short demographic data collection form. Survey data was analysed using SPSS software.

4.6 The interview study

4.6.1 Sample size

The interview study involved 21 children purposively sub-sampled from the larger group that took part in the questionnaire survey. Also 16 parents/guardians of these children took part in the qualitative part of the study. Qualitative research does not look to generalise findings to wider populations but rather to gain an in-depth understanding of phenomena (Brannen, 2005). Thus it uses smaller samples that get persistently engaged to obtain rich data. In light of this, the selected sample for the qualitative part of the study was thought to be sufficient to enhance the four aspects of trustworthiness of qualitative data namely credibility, confirmability, dependability and transferability.

4.6.2 Selecting participants for the interview study

Participants for the qualitative part of the study were selected using a quota sampling technique. In this method a population is sub-divided by known groups (strata) and participants are selected non-randomly (purposively) from each stratum (Brannen, 2005). Seven children were selected from each of the three strata of deprivation.

Children selected for interviews were then given a pack containing an invitation letter for the child and the parent/guardian to participate in the interview part of the study; and the consent letters, one for the parent to agree that the child may participate in the child interviews (appendix 5); and the other for the parent to agree to participate in the adult interviews. Only those nominees whose parents consented for them to participate in the interviews were recruited. Parents who accepted to take part in the adult interviews were asked to complete a tear off slip indicating the address of the most appropriate place they would like the interview to take place, and the most convenient time as well as their contact telephone number.

4.6.3 Methods of data collection – one-to-one semi-structured interviews

Qualitative data from children and parents/guardians was collected using one-to-one semi-structured interviews. Children taking part were interviewed at school in periods suiting the school's convenience. Appointments were scheduled with the parents/guardians for conducting the one-to-one semi-structured interviews. These interviews were carried out in parental homes for some participants or in a neutral location to suit the interviewee for others. In all interview situations, efforts were

taken to create a friendly atmosphere that would allow the participants to talk freely about their experiences.

4.6.3.1 Child interviews

The interviews with children took place at school in a private room. Each interview took about 35 minutes; children were encouraged to speak freely as much as possible. The child interview explored experiences just before participation in the NCMP by asking the children to talk about their feelings upon receiving the invitation letter to participate in the NMCP, whether or not they discussed this letter with the parents and their feelings towards measurement. It proceeded to explore experiences during participation in the NCMP. The interview then explored the general feelings and perceptions of weight status among children. Furthermore, the interview explored experiences of the children after participation in the measurement phase of the NCMP by prompting the children to speak about any changes in behaviours after participation in the NCMP, whether or not the children and/or their parents were eagerly waiting for the NCMP results. The interview proceeded to explore experiences during the feedback process by prompting children to speak about their feelings just before receiving the NCMP results whether or not they were worried, anxious etc, then feelings just after receiving the results whether or not they felt relieved, disappointed or worried. Children were prompted to speak about their reaction towards the results and the comments of the other members of the family. Lastly the interview explored the experiences of children after the feedback process by encouraging them to speak about the changes in their way of life as a result of the NCMP feedback, feelings of worry among the family members, whether or not some help was sought, the providers of help for those who sought help and which help they would recommend to others and for what reasons. All the interviews were audio recorded to ensure that vital information was not lost or missed out in the analysis. The child interview schedule has been attached in appendix 10.

4.6.3.2 Parent/guardian interviews

Each interview with the parents/guardians took approximately 60 minutes and was fully audio-recorded. Like their children, parents/guardians were encouraged to speak freely as much as possible. The interviewer was equipped with the contacts of the expert nurse should any of the participants want to be direct towards services for weight-related issues, or even other issues related to health. Topics explored in the parent/guardian interviews were in many ways similar to those explored in the

child interviews, as indicated in the parent interview schedule attached in appendix 11.

Through the parent/guardian interview phase of the study, the researcher followed the Centre for Health and Social Evaluation (CHASE) lone worker policy i.e. he carried a mobile telephone, left details of his whereabouts with another senior researcher in the CHASE and had a prearranged text signal to call for help or to signal that an interview had been successfully completed. The supervisor was also used as a mentor throughout the course of the study, with the researcher reporting to her any strange things encountered in the field and she provided the necessary support.

4.6.4 Interview data management

Any audio recordings, transcripts of the interviews, notes taken and/or any paper based materials were stored in locked filing cabinets or electronically on password protected computers at the Teesside University for the length of the project. Good qualitative data management involves a high degree of organisation. This was achieved by keeping a clear track record of the number of interviews conducted for both children and their parents/guardians. Transcripts of the child interviews and parent/guardian interviews were kept in separate folders to avoid mixing up of the data. A clear file naming system was developed and followed to avoid confusion, a clear data tracking system was also developed to ensure maximum coherence, transcription procedures were developed and documented to ensure optimal consistency, quality control procedures were developed and implemented to establish a high degree of accuracy and lastly a realistic timeline was put in place to ensure accountability in terms of time and commitment to completion of the analysis.

4.6.5 Quality assurance

For the qualitative data, quality was ensured in a number of ways. First, transcription was done by the interviewer; this was important as it enabled recall of some details that had not been recorded clearly, thus enriching the dataset. Secondly, coding of the data was done by two researchers independently to generate themes and categories. The independent lists were later merged to generate a comprehensive list of the themes and categories which covered all the accounts of the respondents. Audit trails were kept to increase the credibility, confirmability, dependability and transferability of the findings. Triangulation of methods was achieved by conducting interviews with the children as well as with their parents/guardians. This enabled the researcher to establish the truthfulness of the data that the respondents had

provided in the interviews. It is quite common for the parents/guardians to supply incorrect information especially about health issues because they do not want to be judged as irresponsible. By using the triangulation method, it was possible to detect any incorrect or exaggerated information and it was eliminated from the analysis (Bryman, 2001). Also the search for disconfirming information was conducted after the analysis; this enabled the researcher to establish further the trustworthiness of the findings from the qualitative part of the study (Brannen, 2008). Raw data in form of transcripts was also securely kept even after the analysis and could be referred to quite often while interpreting the findings. A saturation point was reached as the interviews were conducted until no new themes were emerging from both the children and parents/guardians. This indicates that all the important aspects regarding child weight status and mental wellbeing were well captured, thus increasing the credibility of the study.

Techniques like member checks and peer debriefing were not applied in this study due to practicality issues. Nevertheless, efforts were put in place to ensure that data was accurately interpreted and no aspects were disregarded as unimportant, as long as they emerged from the data. These efforts included sharing the early attempts to code the data with another researcher at Teesside University and also giving a small sample of transcripts to a member of the research team to ascertain the robustness of the category system developed.

4.6.6 Interview data analysis

Qualitative interviews were transcribed verbatim and the transcripts were analysed using the thematic content analysis method. This method was chosen for use because it allows the researcher to immense him/herself into the data, which enables identification and proper interpretation of the themes rooted in the data (Brannen, 2005). In accordance with Burnard's (1991) method of thematic content analysis, the analysis of qualitative data was done in ten steps summarised below. These enabled the researcher to bring order, structure and meaning to the mass of the data that was collected.

- Step one:

First steps involved making notes after each interview regarding the topics that had been talked about in the interview, a process called transcription. Interviews were transcribed verbatim and all slang words and noises were included in the transcripts. On many occasions, 'memos' about things that attracted the researcher's attention

during data collection were written, as these might later be important in interpreting the data.

- Step two:

The researcher then started to read through the transcripts while making short notes on the general themes that emerged within the transcripts. By doing this, the researcher became immersed into the data which made him fully aware of the 'world view' of the individual participants regarding the topic that had been talked about in the interview.

- Step three:

The transcripts were read through again and many headings/themes were written down to describe all aspects of the content. This process known as 'open coding' was followed by putting different headings/themes into various categories that had emerged.

- Step four:

The list of categories obtained was surveyed by the researcher, grouping together similar ones into broader categories. This was done to reduce the number of categories. The new list of categories obtained was worked through again with very similar categories grouped until a final list was obtained.

- Step five:

The researcher then invited one independent researcher who was a member of the research team in Teesside University Institute for Health and Social Care, to read the transcripts and generate their own category system. The two lists of categories were then discussed and adjustments were made. This ensured the validity of the categorising method in order to prevent researcher bias and thus increase the credibility of the findings. The transcripts were then re-read alongside the agreed list of categories to identify the degree to which the categories covered all aspect of the interviews. This was followed by making necessary adjustments.

- Step six:

The researcher then worked through each transcript, colour coding the different phrases according to the list of categories.

❖ Step seven:

Each coded section of the transcript was cut out of the transcript and all items of each code (with similar colour) were collected together. These were then pasted into folders headed up with the appropriate headings/category names.

❖ Step eight:

All similar sections were then filed together for reference during the write up of the findings. The write up phase involved the researcher picking up a section and selecting different examples of data that had been filed under that section and offering a commentary that linked the examples together. This happened until all the sections were covered. Throughout the entire writing process, the researcher kept referring back to the original recordings and transcripts in order not to lose context of the accounts of the respondents.

❖ Step nine:

In this step, it was preferred to use the option of writing up findings whilst simultaneously referring to literature (Brannen, 2005).

❖ Step ten:

This step involved searching for disconfirming information in order to increase the credibility of the conclusions of the study (Brannen, 2005; Burnard, 1991).

It is important to note that the thematic content analysis method used in this study has been known to have some limitations such as the extent to which one person's views can be compared to those of another and whether or not it is justifiable to consider 'common themes' to belong to a particular category (Brannen, 2005). Aware of this, the researcher elected to avoid using the data collection questions as the themes; instead actual themes were allowed to emerge from the data itself. The researcher also avoided using overlapping themes, and adequate verbatim examples were used from the data itself when writing up to ensure confirmability of the findings. Box 4.2 summarises key messages from the interview study methods.

Box 4.2 Summary of key messages from the interview study methods

- The interview study involved 21 children purposively sub-sampled from the larger group and 16 parents/guardians of these children.
- Qualitative data from both parents and children was collected using one-to-one semi-structured interviews
- Child interviews took about 35 minutes while parent interviews took about 60 minutes.
- Interviews were audio recorded and field notes recorded soon after each interview.
- Interview audio recordings were transcribed verbatim and the transcripts were analysed using Burnard's (1991) thematic content analysis method.

4.7 Ethical considerations

Ethical approval to conduct the study was obtained from Teesside University School of Health and Social Care Research Governance and Ethics Committee. Informed consent was obtained from the parents/guardians of the children; however, literature has indicated dilemmas about consent in studies involving children (Baines, 2011). Certain children may have consent from their parents/guardians to participate when actually they would prefer not to participate, and vice versa. In this study, consent from parents/guardians had to be followed by assent from the child before he/she was recruited as a participant in the study. Only those children for whom we had both parental/guardian consent and child assent were included in the study.

Participants were allowed to opt out of the study at any stage up until the analysis of the data (April 2010) if they felt that they could not continue with the study or if certain aspects of the study impinged on their wellbeing in some way, without having to give a reason.

There is already clear evidence that issues regarding weight status and mental health have been associated with victimisation, resentment and stigmatisation (Morgan *et al.,* 2008); therefore there was a risk of certain questions arousing anger and causing annoyance in some participants. This was prevented by highlighting to parents and children that participants of all backgrounds were being selected; by

focusing on wellbeing rather than obesity or mental illness; by carefully devising the relevant questions to be asked; pilot testing them, and administering them to the participants with appropriate care, so as to evoke delivery of the required information from the participants but without sparking annoyance or causing mental problems to any of them.

Also, it was thought that the researcher's questioning to parents could elicit concerns about their child's weight and wellbeing. The researcher carried the appropriate contact details to refer them to the specialist nurse in charge of the NCMP in Gateshead PCT who was willing to give advice, reassurance and redirection to appropriate services.

No payments were given to participants; however simple rewards/incentives were given to child participants in the form of pens and stickers. The stickers bore the name of the project and the logo of Teesside University.

Chapter 5 – SURVEY FINDINGS

5.1 Introduction

This section presents the findings of the survey phase of the study in text, figures and tables. This chapter sets the scene by exploring the socio-demographic characteristics of the sample using descriptive statistics. This is followed by a description of the main study variables, namely the weight status and the mental wellbeing of children. The association between mental wellbeing and weight status of children is then presented using the appropriate inferential statistics. In addition the impact of different factors on mental wellbeing and weight status of children, and the correlation between the SDQ and GHQ in measuring mental wellbeing among children are presented. This chapter includes summary boxes identifying key findings at the end of each major section.

5.2 Socio-demographic characteristics of children and parents

Socio-demographic characteristics as reported by children on the questionnaire are summarised in Table 5.1. The total number of children who completed the baseline questionnaire was 264; out of these 146 (55.3%) were female. The mean age of the children at baseline was 10.6 years with a standard deviation of 0.4 years. This small standard deviation indicates a small variability in the age of the children. The mean and median ages of the children as indicated in Table 5.1 were almost the same; this is an indicator that age was normally distributed in the sample. The average number of people living in the households from which the participants came was 4, but the range was 13. This indicates a wide variability in the number of people with whom the children lived.

About a third of the children had fathers either doing professional jobs (31.3%) or working as skilled labourers (30.9%). A small percentage of children had parents working in their own businesses (5.5% and 6.2% for fathers and mothers respectively). However more children had mothers doing professional jobs (40.1%) compared to the fathers. Unemployment was higher among mothers (29.3%) compared to fathers (21.2%). On the other hand unskilled labour was a slightly more common category among fathers (11.1%) as compared to mothers (9.1%). It is important to note that data on parental occupation is that volunteered by the children on the questionnaire, such data can sometimes be unreliable. A large

percentage of children do not know what their parents/guardians do. Categories of parental occupation were retrospectively ascribed. Slightly more than half the children (51.9%) were from schools in areas of high deprivation, where eligibility for free school meals in a school is taken as the surrogate measure of deprivation. The percentages of children who lived in areas of moderate deprivation and less deprivation were comparable (22% and 26.1% respectively).

Table 5.1 Socio-demographic characteristics of the sample reported by children

		Mean	SD	Median	Range	N	C%
Child age in years at baseline		10.5	0.4	10.6	3.0	264	
Number of people living at child's home		4	1	4	13	264	
Family Affluence Score		5.5	2	6	8	264	
Child gender	Male					118	44.7%
	Female					146	55.3%
Father's occupation	Unemployed					46	21.2%
	Unskilled labourer					24	11.1%
	Skilled labourer					67	30.9%
	Professional					68	31.3%
	Businessman					12	5.5%
Mother's occupation	Unemployed					71	29.3%
	Unskilled labourer					22	9.1%
	Skilled labourer					37	15.3%
	Professional					97	40.1%
	Business woman					15	6.2%

SD stands for Standard Deviation, N stands for total number and C% stands for column percentage

As a cross check, demographic data was also separately collected from parents/guardians using the demographic data collection form and this has been summarised in Table 5.2. It is important to note that the descriptive statistics

presented in Table 5.2 are based only on the 115 participants who completed this form and not on the sample of participants completing the full survey. The majority of the parents/guardians who completed the data form were female (86.1%). Most parents/guardians ranged between 31 years and 40 years of age. A small percentage of parents/guardians (9.6%) were aged below 21 years. The highest percentage of parents/guardians had their highest qualification as GCSEs/O-level (35.5%) while a small percentage (8.2%) had no qualification at all. In the majority of households (60.2%), the main household earner had a professional job. Almost all parents/guardians were of white ethnic background (96.5%).

Table 5.2 Socio-demographic characteristics of parents reported on the data collection form

		Frequency	Percentage (%)
Gender of the parent or guardian	Male	16	13.9%
	Female	99	86.1%
The parent or guardian age range	Below 21 years	11	9.6%
	21-30 years	10	8.7%
	31-40 years	48	41.7%
	41-50 years	44	38.3%
	More than 50 years	2	1.7%
Parent or guardian highest level of education	No qualification	9	8.2%
	Vocational qualification	10	9.1%
	GCSEs/O-levels	39	35.5%
	A-levels/Diploma	32	29.1%
	University degree	20	18.2%
Occupation of the main household earner	Unemployed	7	6.5%
	Unskilled labourer	10	9.3%
	Skilled labourer	24	22.2%
	Professional job	65	60.2%
	Own business	2	1.9%
Ethnicity	White British	110	96.5%
	Asian	1	0.9%
	White Irish	1	0.9%
	White other	1	0.9%
	Black	1	0.9%

5.4 Weight status among the participating children

In this analysis, the clinical cut off points were used to define weight status among children because the NCMP guidance for analysis by Public Health Observatories and PCTs of 2010 suggests that the weight status reported to parents in the NCMP feedback should be determined using the clinical cut off points using the UK90 growth charts. Thus it was assumed that the weight status parents/guardians received as feedback was determined using the clinical cut off points (National Obesity Observatory, 2010).

The BMI scores were compared on the UK90 growth charts and children were categorised into the different weight statuses using the cut off points described in Chapter two. The next section presents findings about weight status of children calculated from the PCT figures only.

5.4.1 Weight status of children from the PCT reported BMI

Out of 264 parents/guardians contacted only 82 returned fully completed demographic forms with both height and weight written. BMI was calculated for these participants. Table 5.3 summarises the measures of location and the measures of goodness of fit for the height, weight and the BMI variables.

Table 5.3 Measures of location and goodness of fit for the PCT reported weight, height and BMI

	Measures of Location					Goodness of fit*	
	N	Mean	SD	Min	Max	Kolmogorov –Smirnov Z	p-value
PCT reported weight/kgs	85	42.07	10.69	20.20	71.90	0.83	0.50
PCT reported height/m	87	1.47	0.11	1.08	1.72	1.213	0.11
PCT reported BMI	82	19.43	3.51	12.60	30.69	0.99	0.29

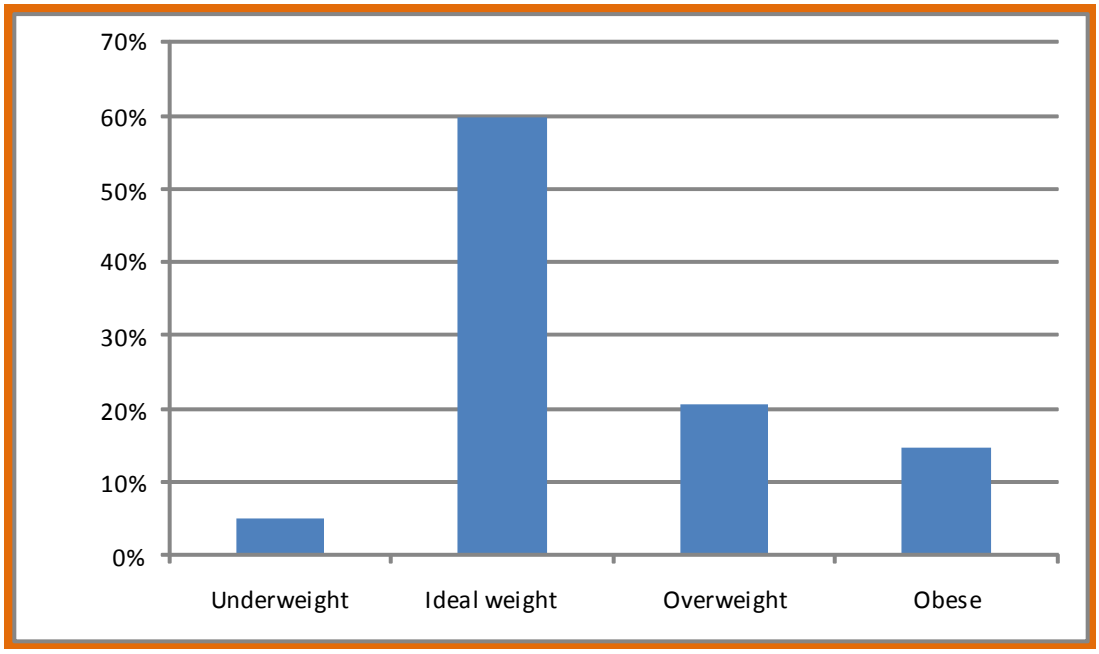
* **Test distribution is normal**

The mean PCT reported weight was 42.07 kg and the standard deviation was 10.69 kg. This standard deviation indicates a wide variation in the weight of the children. This is also depicted in the wide range between 20.20 kg to 71.90 kg. Applying the Kolmogorov-Smirnov test for normality of the distribution of the PCT reported weight, it is identified that the distribution of the NCMP reported weight is not significantly different from the normal distribution ($Z=0.83$, $p>0.05$). On the other

hand the mean PCT reported height for the children was 1.47 m with a standard deviation of 0.11 m. This indicates low variability in the height of the children. Height was also normally distributed in the population as indicated by the Kolmogorov-Smirnov test (Z=1.213, p>0.05). Using the PCT reported height and weight, BMI was calculated using the formula BMI = weight (kg)/height (m^2). The mean BMI was 19.43 $kg.m^{-2}$ and the standard deviation was 3.51 $kg.m^{-2}$. The variability in BMI was also wide as indicated by the range (12.60 – 30.69 $kg.m^{-2}$). PCT reported BMI was normally distributed in the responding population as indicated by the Kolmogorov-Smirnov test (Z=0.99, p>0.05). Individual BMI for every participant was compared with the gender specific UK90 BMI growth charts to derive the weight status categories.

Figure 5.1 below summarises the weight status of children by PCT reported height and weight measurement.

Figure 5.1 Weight status of children from PCT reported height and weight



The majority of children (59.8%) were of an ideal weight, 1 in 5 children were overweight and 1 in 10 children were obese. A very small percentage of children (4.9%) were underweight. Compared to the local and national averages, the prevalence of obesity in children is estimated at 22.4% in Gateshead, 20.6% in the North East of England, and 18.7% in England (Ells *et al.,* 2011). The prevalence of childhood obesity in the current study is less than the estimated local and national averages which is partly due to the use of different cut off points for defining

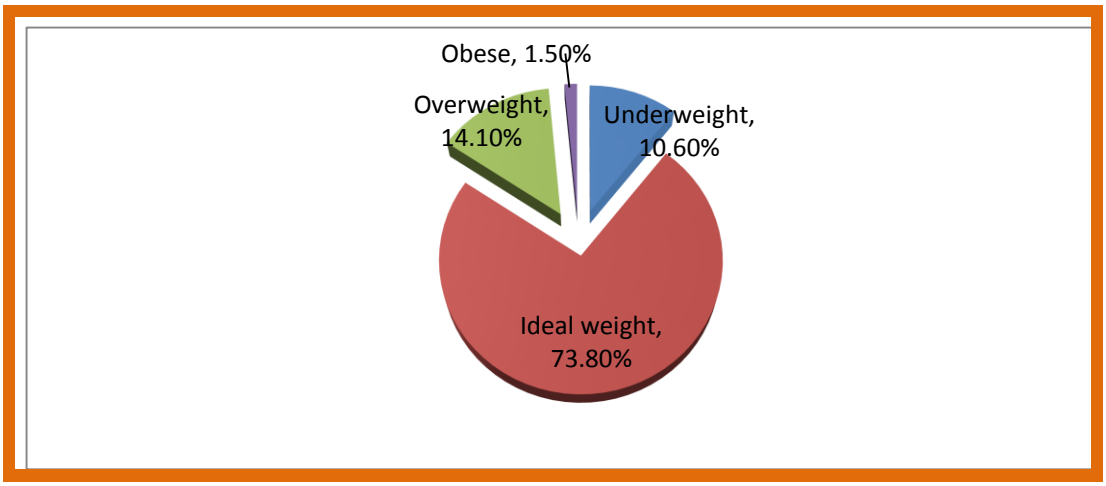
childhood obesity; but also the 'opt-in' selection of participants imposed by ethics may have led to the elimination of many obese and overweight children from the sample.

It was of paramount importance to identify whether or not the weight status of children determined by the PCT figures was similar to the perception of weight status that children held about themselves. The next section reports the findings on perceived weight status among children.

5.4.2 Perceived weight status of children

In the main survey, children were asked to tick a box corresponding to their perceived weight status on the questionnaire. Almost all children (N=263) completed this item on the questionnaire. Figure 5.2 below summarises perceived weight status of children.

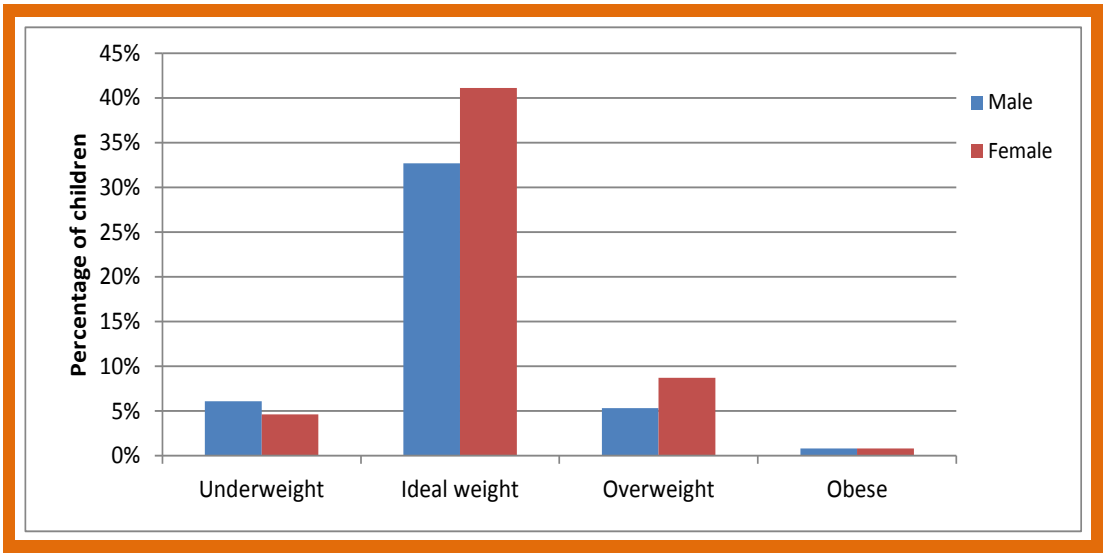
Figure 5.2 Perceived weight status of children



The majority of children (73.8%) perceived themselves as having an ideal weight; about 1 in 10 children perceived themselves as overweight. Similarly about 1 in 10 children perceived themselves as underweight while a very small percentage of children (1.5%) perceived themselves as obese. Perception of weight status has been linked in the literature to gender and social class (Morgan *et al.*, 2008); it was therefore of interest to identify how gender and social class affected perception of weight status by the children.

Figure 5.3 summarises the findings on perceived weight status in relation to gender.

Figure 5.3 Perceived weight status of children in relation to gender



The Chi-square test for the association between perceived weight status and gender indicated no association between these two variables (χ^2 =2.51, df = 3, p>0.05).

It was of interest then to identify whether or not perceived weight status was associated with weight status determined from the PCT reported BMI. The next section discusses the findings regarding this association.

5.4.3 Association between weight status of children from PCT reported height and weight figures and child's perceived weight status.

Table 5.4 compares the weight status of children determined from height and weight figures reported by the PCT and child's perceived weight status. About 1 in 10 children who were of ideal weight by the PCT reported figures (14.3%) perceived themselves as being underweight. The majority of the children who were ideal weight as judged by the PCT reported figures also perceived themselves as having an ideal weight (77.6%). About 1 in 10 children who were of ideal weight by the PCT reported figures (8.2%) perceived themselves as overweight. Of particular interest is the finding that, over three quarters of children considered overweight by the PCT reported figures perceived themselves to be of ideal weight (76.5%) and it is only 17.6% of these overweight children who actually perceived themselves as overweight. All the underweight children according to the PCT figures perceived themselves as having an ideal weight, and just less than half of the obese children (41.7%) perceived themselves as having an ideal weight.

Table 5.4 Comparison between weight status of children from height and weight figures reported by the PCT and perceived weight status

		Perceived weight status of children							
		Underweight		Ideal weight		Overweight		Very overweight	
		Count	Row %	Count	Row %	Count	Row %	Count	Row %
Weight status by PCT reported BMI based on UK90 charts	Ideal weight	7	14.3%	38	77.6%	4	8.2%	0	0.0%
	Overweight	1	5.9%	13	76.5%	3	17.6%	0	0.0%
	Underweight	0	0.0%	4	100.0%	0	0.0%	0	0.0%
	Obese	0	0.0%	5	41.7%	6	50.0%	1	8.3%

In order to determine whether or not these observed differences are statistically significant, a chi-square test was conducted. The results of this test identified a statistical difference between weight status of children determined from PCT figures and perceived weight status (χ^2=22.18, df = 9, p<0.01). This evidence could support the speculation that children are not aware of their true weight status and may often perceive themselves to be of a completely different weight status from their true weight status.

Having presented the findings for actual and perceived weight status, it is important now to turn to the findings for mental wellbeing, since part of the main aim of this research was to investigate the association between weight status and mental wellbeing. This section concludes, however, with Box 5.1 summarising key findings on weight status of children.

Box 5.1 Summary of key findings on weight status of children

- There was a wide variability in the BMI of children. Mean BMI was highest among children (especially boys) in the high deprivation category.
- Using PCT cut off points, the majority of children (59.8%) were ideal weight, 22% of children were overweight and 14% of children were obese. A very small percentage of children (4.9%) were underweight.
- The majority of children (73.8%) in the survey perceived themselves as normal weight, about 1 in 10 children perceived themselves as overweight. Similarly about 1 in 10 children perceived themselves as underweight, while a very small percentage of children (1.5%) perceived themselves as obese.
- About 1 in 10 children who were normal weight perceived themselves as overweight. Over three quarters of overweight children perceived themselves to be normal weight. All underweight children perceived themselves as normal weight, and just less than half of the obese children (41.7%) perceived themselves as normal weight.
- The Chi-square test indicated a strong difference between actual weight status of children and perceived weight status.

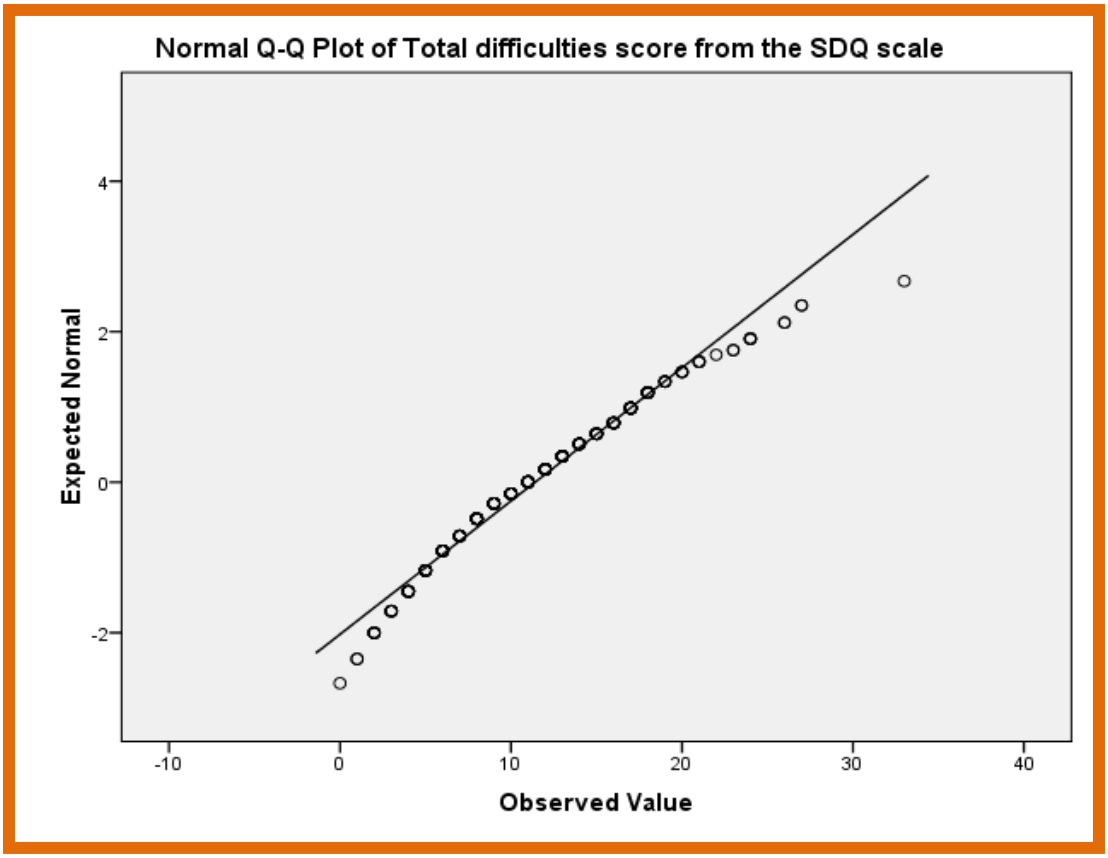
5.5 Mental wellbeing among participating children

Findings on each of the indicators of mental wellbeing are presented in the sections that follow.

5.5.1 Total difficulties among the children

All participating children (N=264) completed the Strengths and Difficulties Questionnaire (SDQ). The Kolmogorov-Smirnov test for normality indicated that total difficulties were not normally distributed in the sample; there was a significant difference between the total difficulties distribution and the normal distribution ($Z = 1.476$, $p<0.05$). Figure 5.4 indicates the quantile-quantile (Q-Q) plot for the total difficulties distribution.

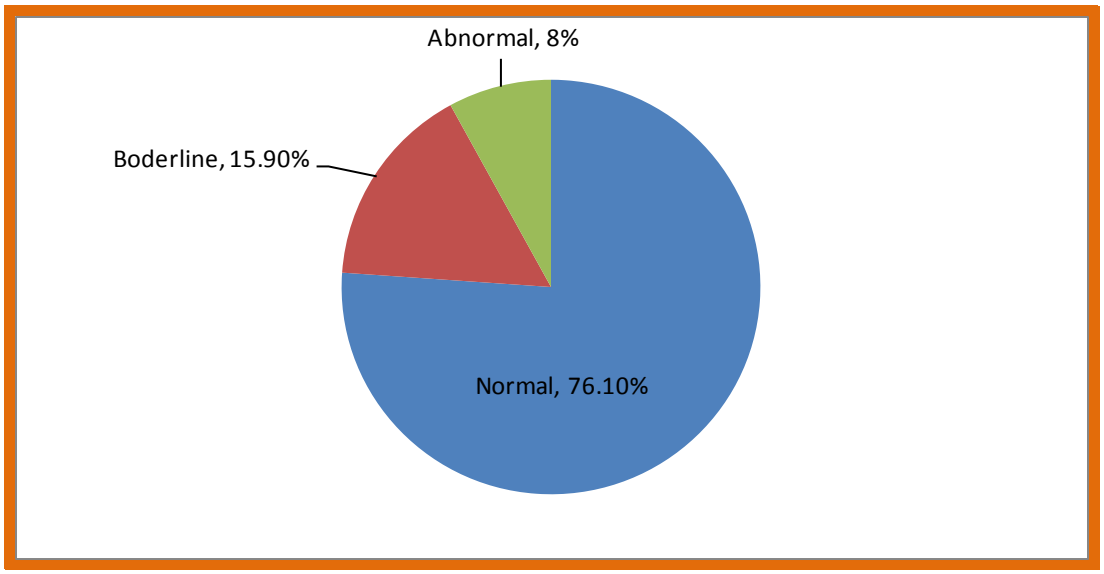
Figure 5.4 The Quantile-Quantile plot for the total difficulties distribution



From Figure 5.4 there are many outliers on one side, skewing the distribution to the right. The total difficulties distribution is therefore positively skewed. The median total difficulties score was 11 scores. The mean total difficulties score was 11.41 scores, the standard deviation was 5.65 scores and the minimum and maximum scores were 0 and 33 respectively. This indicates wide variability in the distribution of total difficulties in the sample. Using standard cut off points discussed in Chapter four, it was possible to categorise children as being normal, borderline or abnormal in terms of total difficulties.

Figure 5.5 identifies the categories of mental wellbeing of children based on the total difficulties variable.

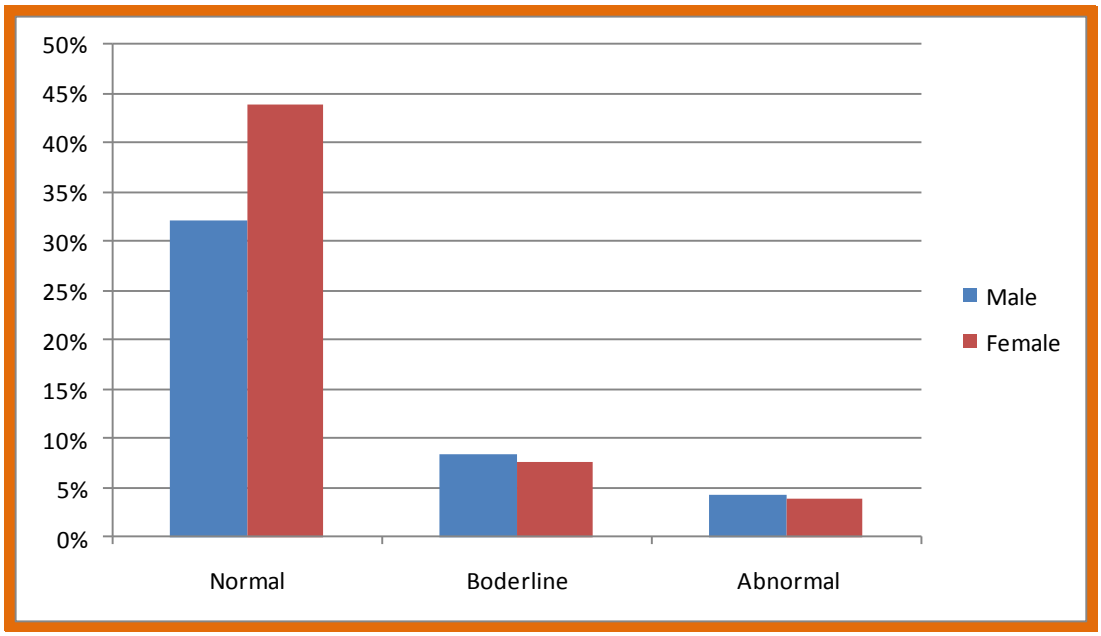
Figure 5.5 Mental wellbeing of children by total difficulties



The majority of children (76.1%) were categorised as normal using SDQ; however, about 15.9% of children were categorised as borderline i.e. they are at a greater risk of developing mental health problems; and just under 1 in 10 children were categorised as abnormal, meaning they had, in all likelihood, clinically diagnosable mental health problems. This finding is in line with national datasets (Green *et al*., 2005; Meltzer *et al.,* 2000).

Mental health problems have been linked to gender, so it was important to identify the variation in the mental wellbeing between girls and boys. Figure 5.6 summarises the findings about mental wellbeing in relation to gender.

Figure 5.6 Mental wellbeing of children (according to SDQ) in relation to gender



The mean and median total difficulties score among boys was 12 scores and the standard deviation was 6 scores. The mean total difficulties score among girls was 11 scores with a standard deviation of 6 scores while the median total score was 10 scores.

In order to determine whether or not there is a significant difference in the total difficulties score between boys and girls a Mann–Whitney *U* test was conducted. This test is the non-parametric counterpart for the independent samples t-test and it is the best for testing difference in means of a skewed variable between two independent samples. This test identified a significant difference in median total difficulties between girls and boys (Mann-Whitney U =7301, Z= -2.132, $p<0.05$).

Further still, mental wellbeing among children has been associated with social class. This analysis investigated the variation in total difficulties in relation to deprivation status of the children. Table 5.5 identifies these findings.

In order to determine whether or not the total difficulties score significantly differed among the categories of deprivation, the Kruskal – Wallis *H* test was conducted. This test is the non-parametric counterpart for the One-Way Analysis of Variance (ANOVA), it was chosen because the total difficulties variable was skewed in the sample. This test identified no difference in the total difficulties among the three categories of deprivation (Chi-square = 2.875, df=2, $p>0.05$).

This means that total difficulties (measured using SDQ) did not differ significantly among the classes of deprivation. The next section present findings on emotional symptoms as an indicator of mental wellbeing among children.

Table 5.5 Mental wellbeing of children by total difficulties in relation to deprivation status

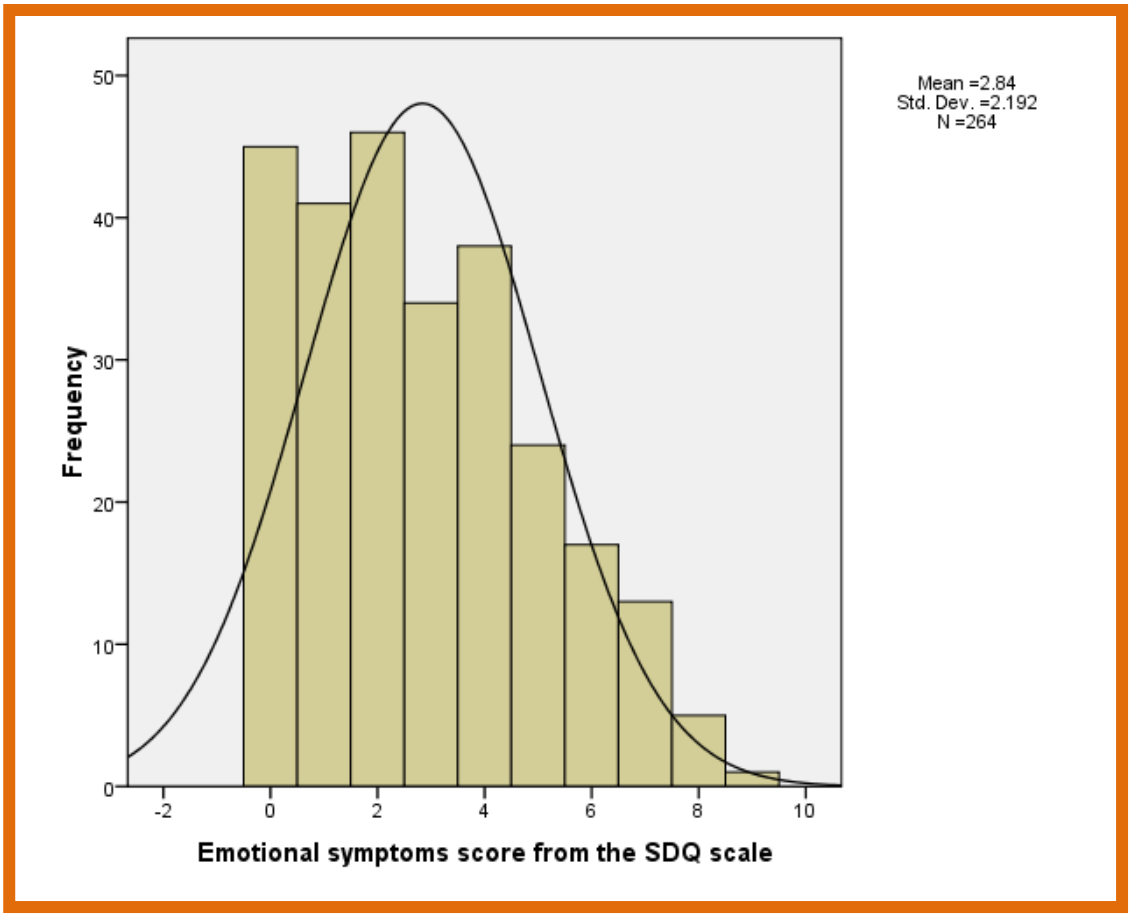
		Deprivation category by free school meals														
		High deprivation					Moderate deprivation					Low deprivation				
Categories		**Mean**	**Median**	**SD**	**Count**	**C %**	**Mean**	**Median**	**SD**	**Count**	**C %**	**Mean**	**Median**	**SD**	**Count**	**C%**
Total difficulties score		12	12	6			11	10	6			11	11	5		
Categories of mental wellbeing by total difficulties score	**Normal**				97	70.8%				46	79.3%				58	84.1%
	Boderline				24	17.5%				8	13.8%				10	14.5%
	Abnormal				16	11.7%				4	6.9%				1	1.4%

5.5.2 Emotional symptoms

The emotional symptoms score was derived and used in this analysis. The Kolmogorov-Smirnov test for normality indicated that emotional symptoms were highly skewed in the sample. There was a significant difference between the emotional symptoms distribution and the normal distribution (Z = 1.476, p<0.001).

Figure 5.7 identifies the distribution of emotional symptoms in the sample.

Figure 5.7 Emotional symptoms sample distribution



There are more outliers on the right side that skew the distribution to the right. The emotional symptoms distribution is therefore positively skewed. The median emotional symptoms score is 2 scores. The minimum emotional symptoms score is 0 and the maximum is 9. This range is wide, indicating wide variability in the emotional symptoms among the participating children.

Using standard cut off points discussed in Chapter four, it was possible to categorise children as being emotionally normal, emotionally borderline or emotionally

abnormal. Table 5.6 summarises the findings on emotional symptoms. The majority of children were emotionally normal (86.4%). About 1 in 10 children were emotionally abnormal and a small percentage of children (6.4%) were found to be emotionally on the borderline.

Emotional symptoms have also been associated with gender of a child. This analysis investigated this aspect. Since the distribution of emotional symptoms is positively skewed, the Mann-Whitney *U* test was used to identify statistical evidence for the difference in emotional symptoms score between boys and girls. This test identified no evidence for this difference (Mann-Whitney U=8349, Z= -0.721, $p>0.05$). This therefore means that emotional symptoms did not significantly differ between boys and girls.

Table 5.6 Emotional symptoms of children by gender

		Child Sex														
		Male					Female					Total				
		Mean	Median	Standard Deviation	Count	C %	Mean	Median	Standard Deviation	Count	C %	Mean	Median	Standard Deviation	Count	C %
Emotional symptoms score		3	2	2			3	3	2			3	2	2		
Categories of emotional symptoms score	Normal				104	88.1%				124	84.9%				228	86.4%
	Borderline				6	5.1%				11	7.5%				17	6.4%
	Abnormal				8	6.8%				11	7.5%				19	7.2%

Table 5.7 Emotional symptoms of children by deprivation status

		Deprivation category by free school meals														
		High deprivation					Moderate deprivation					Low deprivation				
		Mean	Median	Standard Deviation	Count	C %	Mean	Median	Standard Deviation	Count	C %	Mean	Median	Standard Deviation	Count	C %
Emotional symptoms score		3	3	2			3	2	2			2	2	2		
Categories of emotional symptoms score	Normal				117	85.4%				49	84.5%				62	89.9%
	Borderline				7	5.1%				7	12.1%				3	4.3%
	Abnormal				13	9.5%				2	3.4%				4	5.8%

Emotional wellbeing among children has also been associated with social class. This analysis therefore investigated the variation in emotional symptoms in relation to deprivation status of the schools attended by the children (Table 5.7). The median emotional symptoms score was highest in the high deprivation category. The percentage of children with abnormal emotional symptoms (9.5%) was highest in the high deprivation category. It is also important to note that the percentage of children with abnormal emotional symptoms in the low deprivation category (5.8%) was higher than the percentage in the moderate deprivation category (3.4%). There were more children with normal emotional symptoms in the low deprivation category (89.9%) compared to the other categories of deprivation.

However, in order to determine whether or not emotional symptoms significantly differed among the categories of deprivation, the Kruskal – Wallis *H* test was conducted. This test identified evidence for the difference in the median emotional symptoms score among the three categories of deprivation (Chi-square = 6.285, df=2, $p<0.05$). This means that emotional symptoms in children did differ significantly among the classes of deprivation. Highly deprived children were more likely to fall in the range for abnormal emotional symptoms compared to their moderately and less deprived counterparts.

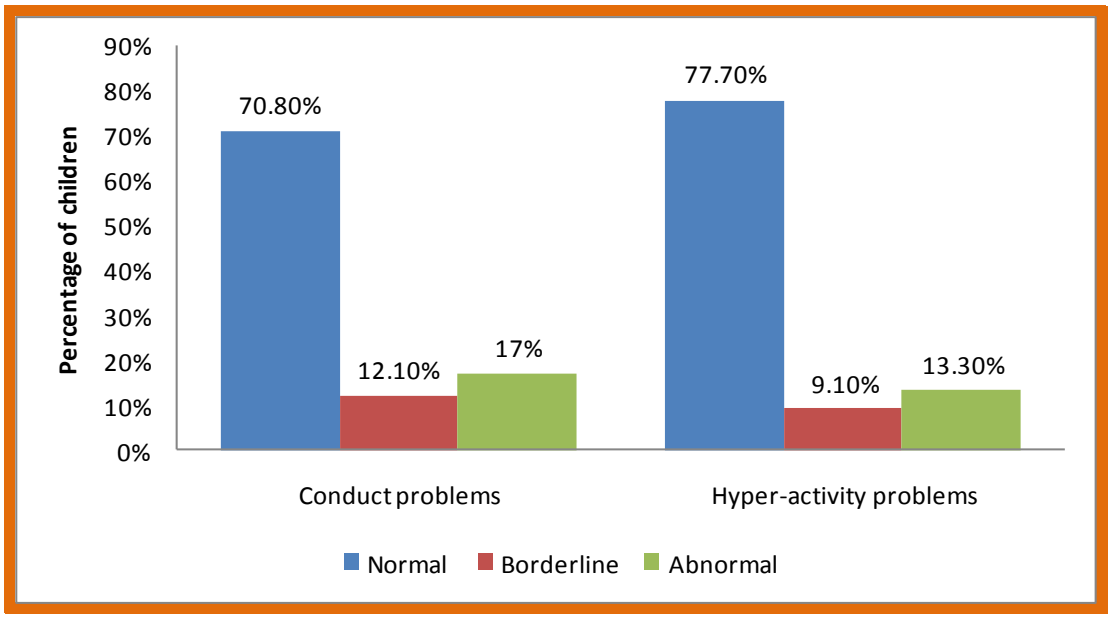
5.5.3 Conduct and hyperactivity problems

The Kolmogorov-Smirnov Z test for normality indicated that conduct and hyperactivity problems were not normally distributed among the children ($Z=2.42$, $p<0.001$) and ($Z=1.83$, $p<0.01$) respectively. The median conduct problems score was 2 scores, the scores ranged from 0 to 9 scores. This indicates a wide variability in the conduct problems among the children. On the other hand the median hyper-activity problems score was 4 scores and the scores ranged from 0 to 10, still indicating a wide variability in the hyper-activity problems scores as well.

Using the standard cut off points discussed in Chapter four, it was possible to categorise children as being normal, borderline or abnormal regarding conduct and hyper-activity problems.

Figure 5.8 summarises these findings.

Figure 5.8 Conduct and hyper-activity problems among children



The majority of children had normal conduct (70.8%). However about 1 in 5 children had abnormal conduct and 1 in 10 children were at borderline for conduct problems. In terms of hyper-activity problems, the majority of children were normal (77.7%), about 1 in 10 children had abnormal hyper-activity and a small percentage (9.1%) had borderline hyper-activity. Abnormal conduct among children (17%) was more prevalent than abnormal hyper-activity (13.3%).

Conduct problems and hyper-activity problems have been linked to gender of the children. This analysis also investigated variations in conduct problems and hyper-activity problems among boys and girls.

Table 5.8 identifies the findings about conduct and hyper-activity problems by gender of the children.

Table 5.8 Conduct and hyper-activity problems by gender among the children

		Child gender									
		Male					Female				
		Mean	Median	SD	Count	C%	Mean	Median	SD	Count	C%
Conduct problems score		3	3	2			2	2	2		
Hyper-activity score		4	4	2			3	3	2		
Conduct problems	Normal				73	61.9%				114	78.1%
	Borderline				16	13.6%				16	11.0%
	Abnormal				29	24.6%				16	11.0%
Hyperactivity problems	Normal				84	71.2%				121	82.9%
	Borderline				11	9.3%				13	8.9%
	Abnormal				23	19.5%				12	8.2%

The median conduct problems score was higher among boys compared to girls, likewise the median hyper-activity score was higher among boys than girls. A quarter of the boys in the sample (24.6%) had abnormal conduct problems and 1 in 10 boys had borderline conduct problems. On the other hand a smaller percentage of girls (11%) had abnormal conduct problems and a bigger percentage of the girls (78.1%) had normal conduct. Likewise abnormal hyper-activity problems were more prevalent among boys (19.5%) compared to girls (8.2%). A larger percentage of girls (82.9%) were normal in terms of hyper-activity problems.

The prevalence of conduct problems and hyper-activity problems among boys was twice as high as the prevalence for these problems among girls. In order to determine whether or not these observations are statistically significant, the Mann–Whitney *U* test was conducted. This test identified a strong difference in conduct problems between boys and girls (Mann-Whitney U = 6819.5, Z = -2.95, $p<0.01$). Boys were more likely to have conduct problems compared to girls. Likewise the test also indicated a strong difference in hyper-activity problems between boys and girls (U=6596, Z= -3.301, p=0.001). Again boys were more likely to have hyper-activity problems compared to girls.

Conduct and hyper-activity problems among children are also associated with deprivation. This analysis investigated the differences in conduct and hyper-activity problems among different categories of deprivation for the children. Table 5.9 summarises these findings.

The median conduct problems score was highest in the high deprivation category while it was similar in the moderate and low deprivation categories. On the other hand the median hyper-activity problems score was similar across all the three categories of deprivation. The high deprivation category had the highest prevalence of abnormal conduct problems with 1 in 5 children having abnormal conduct problems. The prevalence of conduct problems among the less deprived children (15.9%) was higher than the prevalence among the moderately deprived (10.3%). The moderate deprivation category had the highest percentage of children with normal conduct (77.6%) with the high deprivation category having the lowest percentage of children with normal conduct (66.4%).

Although the percentage of children with abnormal conduct problems in the high deprivation category (20.4%) was twice as high as those in the moderate deprivation category (10.3%), the moderate deprivation category had a higher percentage of children who had abnormal hyper-activity problems (15.5%) compared to the high and low deprivation categories (12.4% and 13% respectively). It is important to note that the high deprivation category had the lowest percentage of children with abnormal hyper-activity problems, but it had the highest percentage of borderline children (10.9%) and the lowest percentage of normal children in terms of hyper-activity compared to the other categories of deprivation. Children in both highly and low deprived areas were more likely to present with conduct disorders than hyperactivity disorders, whereas children in moderately deprived areas were more likely to present with hyper-activity disorders than conduct disorders.

Table 5.9 Conduct and hyper-activity problems by deprivation status

		Deprivation category by percentage free school meals														
		High deprivation					Moderate deprivation					Low deprivation				
		Mean	Median	SD	Count	C %	Mean	Median	SD	Count	C %	Mean	Median	SD	Count	C %
Conduct problems score		3	3	2			2	2	2			2	2	2		
Hyper-activity score		4	4	2			4	4	2			4	4	2		
Conduct problems	Normal				91	66.4%				45	77.6%				51	73.9%
	Borderline				18	13.1%				7	12.1%				7	10.1%
	Abnormal				28	20.4%				6	10.3%				11	15.9%
Hyperactivity problems	Normal				105	76.6%				45	77.6%				55	79.7%
	Borderline				15	10.9%				4	6.9%				5	7.2%
	Abnormal				17	12.4%				9	15.5%				9	13.0%

But the observations made above needed to be tested for statistical significance. The Kruskal – Wallis *H* test was conducted. This test identified strong evidence for the difference in conduct problems among the classes of deprivation (Chi-square statistic=9.282, df=2, p=0.01). Highly deprived children were more likely to present with conduct problems. However the test identified no evidence for the difference in hyper-activity problems among the classes of deprivation (Chi-square statistic=0.559, df=2, p=0.756).

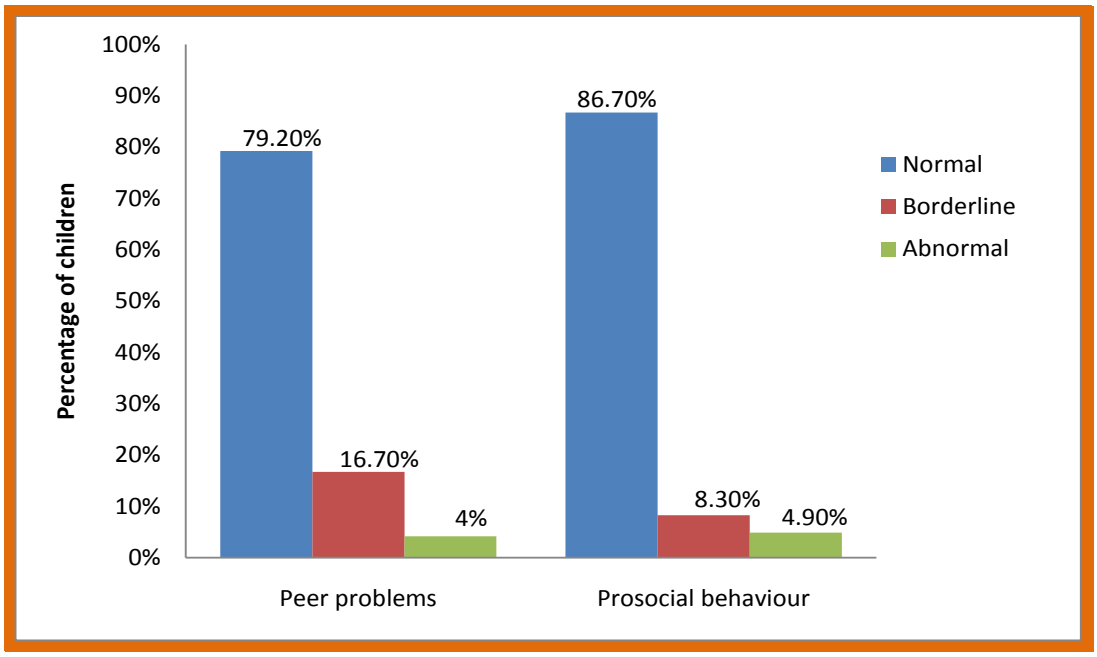
5.5.4 Peer problems and pro-social behaviours

The Kolmogorov-Smirnov test for normality indicated very strong evidence for the difference between the peer problems distribution and the normal distribution. This means that peer problems were skewed in the population ($Z=3.09$, $p<0.001$). Likewise there was very strong evidence for the difference between prosocial behaviours distribution and the normal distribution ($Z=2.35$, $p<0.001$), thus prosocial behaviours were skewed in the population.

The median peer problems score was 2 scores and the scores ranged from 0 to 10 scores. This indicates a wide variability in the peer problems. On the other hand the median prosocial behaviours score was 8 scores with the scores ranging between 2 and 10 scores. Using standard cut off points, it was possible to categorise children as being normal, borderline or abnormal in terms of peer problems and prosocial behaviours.

Figure 5.9 summarises the findings.

Figure 5.9 Peer problems and prosocial behaviours among children



The prevalence of peer problems among the children was low, only 4% of the children were abnormal in terms of peer problems. The majority of children (79.2%) were normal in terms of peer problems. But almost 1 in 5 children were found to be at borderline for peer problems. The trends are not far different for the prosocial behaviour variable. The majority of children (86.7%) had normal pro-social behaviours, and about 1 in 10 children had abnormal prosocial behaviour.

Like all the other indicators of mental wellbeing in children, peer problems and prosocial behaviour are associated with gender. This analysis investigated the variation of these variables between boys and girls.

Table 5.10 summarises these findings.

Table 5.10 Peer problems and prosocial behaviour by gender among children

		Child gender									
		Male					Female				
		Median	Mean	SD	Count	C%	Median	Mean	SD	Count	C%
Peer problems score		2	2	2			2	2	2		
Prosocial behaviour score		7	7	2			8	8	2		
Peer problems	Normal				88	74.6%				121	82.9%
	Borderline				26	22.0%				18	12.3%
	Abnormal				4	3.4%				7	4.8%
Prosocial behaviour	Abnormal				12	10.2%				1	0.7%
	Borderline				13	11.0%				9	6.2%
	Normal				93	78.8%				136	93.2%

From the table, the median peer problems score and the median prosocial behaviour score were the same in boys and girls. The percentage of boys with abnormal prosocial behaviour (10.2%) was ten times greater than that for girls (0.7%). The majority of girls (93.2%) had normal prosocial behaviours.

In order to test the statistical significance of the observations, the Mann-Whitney *U* test was conducted. The choice of this test was because peer problems and prosocial behaviours were skewed in the population. The test indicated no difference in peer problems between boys and girls (Mann-Whitney U=8309, Z=-0.504, $p>0.05$). On the other hand the test indicated a strong difference in prosocial behaviours between boys and girls (Mann-Whitney U=5340, Z= -0.504, $p<0.05$). Boys were more likely to fall within the range of abnormal pro-social behaviours compared to girls.

This analysis also investigated the association between peer problems and prosocial behaviours and deprivation status of children as measured by percentage of children eligible for free school meals in the school. Table 5.11 summarises these findings. The median scores for both peer problems and prosocial behaviours were the same across all the three classes of deprivation. The highest prevalence of abnormal peer problems was among children living in moderately deprived areas (8.6%).

Table 5.11 Peer problems and prosocial behaviour by deprivation status

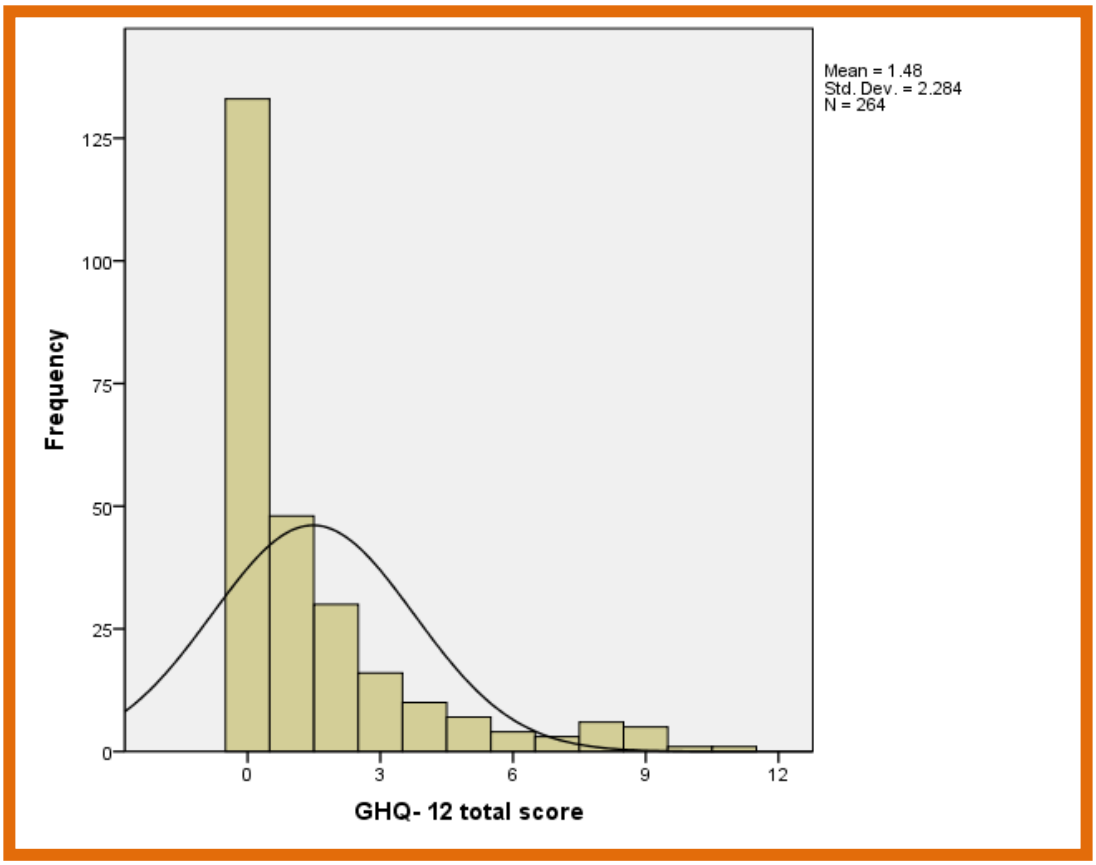
		Deprivation category by percentage free school meals														
		High deprivation					Moderate deprivation					Low deprivation				
		Median	Mean	SD	Count	C %	Median	Mean	SD	Count	C %	Median	Mean	SD	Count	C %
Peer problems score		2	2	2			2	2	2			2	2	2		
Prosocial behaviour score		8	8	2			8	8	2			8	8	2		
Peer problems score	Normal				110	80.3%				44	75.9%				55	79.7%
	Borderline				22	16.1%				9	15.5%				13	18.8%
	Abnormal				5	3.6%				5	8.6%				1	1.4%
Prosocial behaviour	Abnormal				8	5.8%				1	1.7%				4	5.8%
	Borderline				11	8.0%				4	6.9%				7	10.1%
	Normal				118	86.1%				53	91.4%				58	84.1%

In order to test these observations for statistical significance, the Kruskal – Wallis *H* test was conducted. This test identified no evidence for the difference in peer problems among the three classes of deprivation (Chi-square statistic = 0.953, df=2, p>0.05). Similarly there was no evidence for the difference in prosocial behaviours among the three classes of deprivation (Chi-square statistic = 1.704, df=2, p>0.05).

5.5.5 Mental wellbeing of children measured by the GHQ-12

The mental wellbeing of children was also estimated using the GHQ-12 scale described in Chapter four. The items on the GHQ-12 were scored by the recommended bimodal scoring method of 0-0-1-1 (Goldberg, 1997). The distribution of the GHQ-12 scores was severely positively skewed as Figure 5.10 below indicates.

Figure 5.10 Distribution for the GHQ-12[5] scores for children



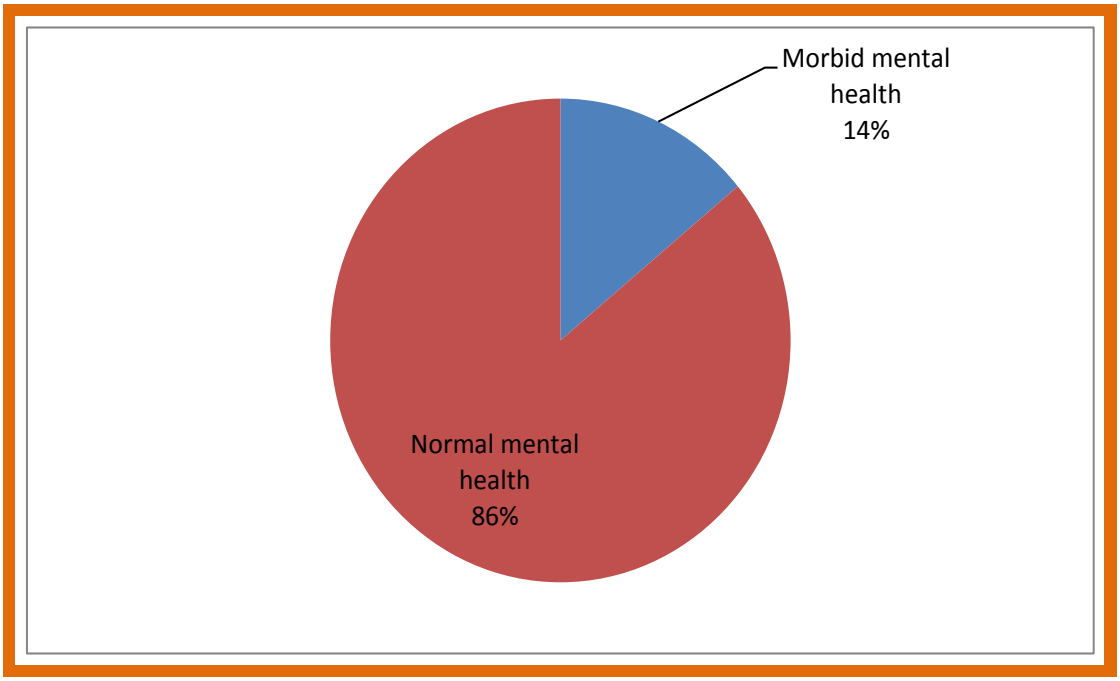
[5] GHQ-12 is a standard scale with 12 items used to estimate mental wellbeing (Goldberg, 1997).

The median GHQ-12 score was 0 scores, the mean GHQ-12 score was 1.48 scores and the standard deviation was 2.3. The scores ranged from 0 to 11. The Kolmogorov-Smirnov test for goodness of fit indicated very strong evidence for the difference between the GHQ-12 score distribution and the normal distribution ($Z=4.361$, $p<0.001$). This confirms that mental wellbeing of children measured by the GHQ-12 was skewed in the sample.

Using standard cut off points, it is possible to identify the percentage of children with mental health morbidity. However cut off points vary when using the GHQ-12, depending on the population being studied. Reuter and Harter (2006) noted that these cut off points range between 2-6 scores, but Goldberg *et al* (1998) had earlier suggested that the mean score of the GHQ-12 should provide a rough guide for the cut off point to be used, with lower mean scores leading to the use of lower cut off points. In this analysis, the mean GHQ-12 score was low (1.48) hence the use of a lower threshold/cut off point of ≥ 4 for mental health morbidity. This has also been used in other studies involving young samples (Reuter and Harter, 2006).

Figure 5.11 demonstrates the prevalence of mental health morbidity according to this cut off point.

Figure 5.11 Prevalence of mental health morbidity among children by the GHQ-12



About 1 in 10 children were found to be having mental health morbidity while the majority of children (86%) were mentally normal. When broken down by gender,

Table 5.12 summarises the findings. These findings indicate that boys were more likely to be diagnosed with mental health morbidity compared to girls using the GHQ-12.

Table 5.12 Gender differences of the mental wellbeing of children measured by GHQ-12

		Child Sex									
		Male					Female				
		Mean	Median	SD	Count	C%	Mean	Median	SD	Count	C%
GHQ-12 score		2	1	3			1	0	2		
Mental wellbeing	Mentally morbid				24	20%				13	9%
	Mentally normal				94	80%				133	91%

In order to identify whether or not mental wellbeing of children measured by the GHQ-12 is statistically significantly associated with gender of the children, a Chi-square test was conducted. This test was chosen because it does not assume normality of the distribution of the dependent variable and since mental wellbeing is skewed in the population, this would be the best test to use. This test Identified a strong association between mental wellbeing measured by the GHQ-12 and gender (χ^2=7.081, df=1, p<0.01). Boys were more likely to be diagnosed with mental health morbidity using the GHQ-12 compared to girls (OR=0.38, 95%CI=0.19-0.79). The absence of 1 in the 95% confidence interval around the odds ratio indicates statistical significance for this difference.

But the main aim of this study was to investigate the association between weight status and mental wellbeing of children. The next section presents findings on this association, but first, Box 5.2 summarises the key findings on mental wellbeing in children.

Box 5.2 Summary of key findings on mental wellbeing of children

- 1 in 10 children were found to have potentially clinically diagnosable mental health problems while 1 in 5 children were categorised as borderline, meaning they were at a greater risk of developing mental health problems. This is in line with national trends measured elsewhere.
- About 1 in 10 children had emotional problems, 1 in 5 children had conduct problems, while 1 in 10 children had hyper-activity disorder.
- About 1 in 10 children had abnormal pro-social behaviour and 1 in 5 children were found to be at borderline for peer problems.
- Boys were more likely to have conduct and hyper activity problems compared to girls.

5.6 Association between mental wellbeing and weight status of children

As already discussed above, data on weight status was collected in three different ways namely: PCT reported (from data collection form completed by parents post NCMP feedback), and both self reported weight and perceived weight status (both from self completion survey by children). The next sections will discuss the association between mental wellbeing and weight status obtained from PCT reported figures and perceived weight status.

5.6.1 Association between mental wellbeing and the PCT reported weight status

A Chi-square test was conducted to test for the relationship between the indicators of mental wellbeing and PCT reported weight status of the children.

Table 5.13 summarises the findings from this test and Table 5.14 shows the raw data used to conduct the test.

Table 5.13 Chi-square test between indicators of mental wellbeing and categories of weight status determined from height and weight reported by the PCT

Indicators of mental wellbeing	N	Chi-Square(χ^2)	df	p-Value (Sig. 2-sided)
Total difficulties	82	7.533	6	0.274
Emotional problems	82	4.486	6	0.611
Conduct problems	82	3.065	6	0.801
Hyper-activity problems	82	2.940	6	0.820
Peer problems	82	3.625	6	0.727
Prosocial behaviour	82	4.362	6	0.628
GHQ-12 scores	82	0.950	3	0.813

df stands for degrees of freedom

The test indicated no significant relationship between all the indicators of mental wellbeing and the PCT reported weight status of children. Total difficulties were not significantly associated with the PCT reported weight status (χ^2=7.533, df=6, p>0.05). This was similar for emotional problems (χ^2=4.486, df=6, p>0.05), conduct problems (χ^2=3.065, df=6, p>0.05), hyper-activity problems (χ^2=2.940, df=6, p>0.05), peer problems (χ^2=3.625, df=6, p>0.05), and pro-social behaviour (χ^2=4.362, df=6, p>0.05). Using the categories of mental wellbeing derived from the

GHQ-12 scores, the result was similar, with no significant association between mental wellbeing and PCT reported weight status (χ^2=0.95, df=3, p>0.05).

Table 5.14 Raw data for the indicators of mental wellbeing and PCT reported weight status

		PCT reported weight status							
		Underweight		Ideal weight		Overweight		Obese	
		Count	C %	Count	C%	Count	C%	Count	C %
Total difficulties	Normal	4	4.9%	34	41.5%	13	15.9%	9	11.0%
	Borderline	0	0.0%	11	13.4%	2	2.4%	0	0.0%
	Abnormal	0	0.0%	4	4.9%	2	2.4%	3	3.7%
Emotional problems	Normal	4	4.0%	38	46.3%	16	19.5%	9	11.0%
	Borderline	0	0.0%	6	7.3%	0	0.0%	1	1.2%
	Abnormal	0	0.0%	5	6.1%	1	1.2%	12	14.6%
Conduct problems	Normal	3	3.7%	34	41.5%	13	15.9%	8	9.8%
	Borderline	0	0.0%	9	11.0%	2	2.4%	1	1.2%
	Abnormal	1	1.2%	6	7.3%	2	2.4%	3	3.7%
Hyper-activity problems	Normal	4	4.9%	39	47.6%	13	15.9%	8	9.8%
	Borderline	0	0.0%	1	1.2%	1	1.2%	1	1.2%
	Abnormal	0	0.0%	9	11.0%	3	3.7%	3	3.7%
Peer problems	Normal	3	3.7%	38	46.3%	11	13.4%	9	11%
	Borderline	1	1.2%	9	11%	6	7.3%	2	2.4%
	Abnormal	0	0.0%	2	2.4%	0	0.0%	1	1.2%
Prosocial behaviour	Normal	0	0.0%	4	4.9%	1	1.2%	0	0.0%
	Borderline	1	1.2%	5	6.1%	1	1.2%	0	0.0%
	Abnormal	3	3.7%	40	48.8%	15	18.3%	12	14.6%
GHQ-12 scores	Normal	4	4.9%	41	50%	15	18.3%	10	12.2%
	Abnormal	0	0.0%	8	9.8%	2	2.4%	2	2.4%

It is apparent that most of the children did not know exactly how tall they were in any form of measurement unit; similarly, neither did they know how much they weighed objectively. However they did have an overall perception of their weight status. Perhaps it is this perceived weight status that is more important in terms of mental-wellbeing. The next section therefore explores the relationship between mental wellbeing and perceived weight status.

5.6.2 Association between mental wellbeing and perceived weight status

A chi-square test was conducted to test the null hypothesis that mental wellbeing of children is not significantly associated with their perceived weight status.

Table 5.15 summarises the findings from this test.

Table 5.15 Chi-square test between indicators of mental wellbeing and perceived weight status of children

Indicators of mental wellbeing	N	Chi-Square(χ^2)	df	p-Value (Sig. 2-sided)
Total difficulties	263	33.96	6	0.000
Emotional problems	263	20.50	6	0.002
Conduct problems	263	17.95	6	0.011
Hyper-activity problems	263	41.85	6	0.000
Peer problems	263	36.58	6	0.000
Prosocial behaviour	263	7.103	6	0.311
GHQ-12 scores	263	27.631	3	0.000

df stands for degrees of freedom

The test identified strong evidence for a significant relationship between mental wellbeing indicated by total difficulties and perceived weight status of the children (χ^2=33.96, df=6, p<0.001). Children who perceived themselves to be overweight, obese and underweight were less likely to have total difficulties scores in the normal range, whereas children who perceived themselves as normal weight were more likely to have total difficulties scores in the normal range. Table 5.16 identifies raw data for the cross-tabulation of categories of mental wellbeing by total difficulties score and perceived weight status.

Table 5.16 Raw data for the cross-tabulation of mental wellbeing by total difficulties scores and perceived weight status

			Mental wellbeing by Total difficulties score			
			Normal	Boderline	Abnormal	Total
Perceived weight status of children	Underweight	Count	17	7	4	28
		% of Total	6.5%	2.7%	1.5%	10.6%
	Normal	Count	159	28	7	194
		% of Total	60.5%	10.6%	2.7%	73.8%
	Overweight	Count	25	4	8	37
		% of Total	9.5%	1.5%	3.0%	14.1%
	Very overweight	Count	0	2	2	4
		% of Total	0.0%	0.8%	0.8%	1.5%
Total		Count	201	41	21	263
		% of Total	76.4%	15.6%	8.0%	100.0%

Likewise there was strong evidence for a significant relationship between emotional symptoms and perceived weight status of children (χ^2=20.50, df=6, p<0.01). Children who perceived themselves as being underweight, overweight and obese were less likely to have emotional symptoms scores in the normal range whereas the children who perceived themselves to be of normal weight were more likely to have emotional scores in the normal range. Table 5.17 identifies raw data for the cross-tabulation of emotional symptoms and perceived weight status.

Table 5.17 Raw data for the cross-tabulation of emotional symptoms and perceived weight status

			Emotional symptoms			
			Normal	Boderline	Abnormal	Total
Perceived weight status of children	Underweight	Count	25	0	3	28
		% of Total	9.5%	0.0%	1.1%	10.6%
	Normal	Count	175	12	7	194
		% of Total	66.5%	4.6%	2.7%	73.8%
	Overweight	Count	26	4	7	37
		% of Total	9.9%	1.5%	2.7%	14.1%
	Very overweight	Count	2	1	1	4
		% of Total	0.8%	0.4%	0.4%	1.5%
Total		Count	228	17	18	263
		% of Total	86.7%	6.5%	6.8%	100.0%

Further still, there was evidence for a significant relationship between conduct problems and perceived weight status of children (χ^2=17.95, df=6, p<0.05). Again children who perceived themselves to be underweight, overweight and obese were less likely to have conduct problems scores in the normal range whereas those children who perceived themselves to be of normal weight were more likely to have conduct scores in the normal range. Table 5.18 identifies raw data for the cross-tabulation of conduct problems and perceived weight status.

Table 5.18 Raw data for the cross-tabulation of conduct problems and perceived weight status

			Conduct problems			
			Normal	Borderline	Abnormal	Total
Perceived weight status of children	Underweight	Count	15	4	9	28
		% of Total	5.7%	1.5%	3.4%	10.6%
	Normal	Count	145	22	27	194
		% of Total	55.1%	8.4%	10.3%	73.8%
	Overweight	Count	26	5	6	37
		% of Total	9.9%	1.9%	2.3%	14.1%
	Very overweight	Count	0	1	3	4
		% of Total	0.0%	0.4%	1.1%	1.5%
Total		Count	186	32	45	263
		% of Total	70.7%	12.2%	17.1%	100.0%

The test also identified strong evidence for a significant relationship between hyper-activity problems and perceived weight status of children (χ^2=41.85, df=6, p<0.001). Hyper activity problems were the most strongly associated with perceived weight status of children. None of the children who perceived themselves to be obese had hyper-activity scores in the normal range. Most of the children who perceived themselves to be underweight and overweight had hyperactivity scores in the abnormal and borderline ranges. However most of the children who perceived themselves to be of normal weight had their hyper-activity scores in the normal range. Table 5.19 identifies raw data for the cross-tabulation of hyperactivity problems and perceived weight status.

Table 5.19 Raw data for the cross-tabulation of hyperactivity problems and perceived weight status

			Hyperactivity problems			
			Normal	Borderline	Abnormal	Total
Perceived weight status of children	Underweight	Count	16	1	11	28
		% of Total	6.1%	0.4%	4.2%	10.6%
	Normal	Count	163	15	16	194
		% of Total	62.0%	5.7%	6.1%	73.8%
	Overweight	Count	25	7	5	37
		% of Total	9.5%	2.7%	1.9%	14.1%
	Very overweight	Count	0	1	3	4
		% of Total	0.0%	0.4%	1.1%	1.5%
Total		Count	204	24	35	263
		% of Total	77.6%	9.1%	13.3%	100.0%

Peer problems were also significantly associated with perceived weight status of children (χ^2=36.58, df=6, p<0.001). Children who perceived themselves as having a normal weight were more likely to have peer problems scores in the normal range whereas children who perceived themselves as overweight, underweight and obese were less likely to have peer problems scores in the normal range. Table 5.20 identifies raw data for the cross-tabulation of peer problems and perceived weight status.

Table 5.20 Raw data for the cross-tabulation of peer problems and perceived weight status

			Peer problems			
			Normal	Borderline	Abnormal	Total
Perceived weight status of children	Underweight	Count	21	6	1	28
		% of Total	8.0%	2.3%	0.4%	10.6%
	Normal	Count	164	26	4	194
		% of Total	62.4%	9.9%	1.5%	73.8%
	Overweight	Count	22	12	3	37
		% of Total	8.4%	4.6%	1.1%	14.1%
	Very overweight	Count	2	0	2	4
		% of Total	0.8%	0.0%	0.8%	1.5%
Total		Count	209	44	10	263
		% of Total	79.5%	16.7%	3.8%	100.0%

Conversely, there was no evidence for a significant relationship between prosocial behaviour and perceived weight status (χ^2=7.103, df=6, p>0.05). Most children tended to have prosocial behaviour scores in the normal range; in fact none of the

children who perceived themselves to be obese had their prosocial behaviour score in the abnormal and/or borderline range. Table 5.21 identifies raw data for the cross-tabulation of prosocial behaviour and perceived weight status.

Table 5.21 Raw data for the cross-tabulation of prosocial behaviour problems and perceived weight status

			Prosocial behaviour			
			Abnormal	Boderline	Normal	Total
Perceived weight status of children	Underweight	Count	3	5	20	28
		% of Total	1.1%	1.9%	7.6%	10.6%
	Normal	Count	8	15	171	194
		% of Total	3.0%	5.7%	65.0%	73.8%
	Overweight	Count	2	2	33	37
		% of Total	0.8%	0.8%	12.5%	14.1%
	Very overweight	Count	0	0	4	4
		% of Total	0.0%	0.0%	1.5%	1.5%
Total		Count	13	22	228	263
		% of Total	4.9%	8.4%	86.7%	100.0%

The Chi-square test was also performed to test the relationship between perceived weight status and mental wellbeing derived from the GHQ-12 scores. The test indicated very strong evidence for a significant relationship between perceived weight status and mental wellbeing (χ^2=27.631, df=3, p<0.001). Children who perceived themselves as obese were more likely to have GHQ-12 scores indicating mental health morbidity whereas children who perceived themselves as normal were more likely to have GHQ-12 scores indicating normal mental health. Table 5.22 identifies raw data for the cross-tabulation of mental wellbeing by the GHQ-12 score and perceived weight status.

Table 5.22 Raw data for the cross-tabulation of mental wellbeing by GHQ-12 scores and perceived weight status

			Mental wellbeing by GHQ-12 scores		
			Normal mental health	Morbid mental health	Total
Percieved weight status of children	Underweight	Count	19	9	28
		% of Total	7.2%	3.4%	10.6%
	Normal	Count	178	16	194
		% of Total	67.7%	6.1%	73.8%
	Overweight	Count	29	8	37
		% of Total	11.0%	3.0%	14.1%
	Very overweight	Count	1	3	4
		% of Total	0.4%	1.1%	1.5%
Total		Count	227	36	263
		% of Total	86.3%	13.7%	100.0%

These findings indicate that perceived weight status could be a major factor impacting on mental wellbeing of children rather than their actual weight status. There are, however, a number of other factors that are assumed to impact on the mental wellbeing of children, as well as their weight status. These include lifestyle behaviours, social support. These factors were investigated in this study and the findings are presented in the sections that follow. But first, Box 5.3 summarises the key findings regarding the relationship between weight status and mental wellbeing.

Box 5.3 Summary of key findings on the relationship between weight status and mental wellbeing

- There was no significant relationship between any of the indicators of mental wellbeing used and the PCT reported weight status of children.
- However, there was a strong relationship between mental wellbeing and perceived weight status of the children.
- Children who perceived themselves to be overweight, obese and underweight were less likely to have total difficulties scores in the normal range, whereas children who perceived themselves as normal weight were more likely to have total difficulties scores in the normal range.
- The prosocial behaviour score was not significantly associated with perceived weight status.
- Perceived weight status could be a major factor impacting on mental wellbeing of children. Though since the data analysis reveals an association not causation, it could be argued that mental wellbeing affects the perceived weight status

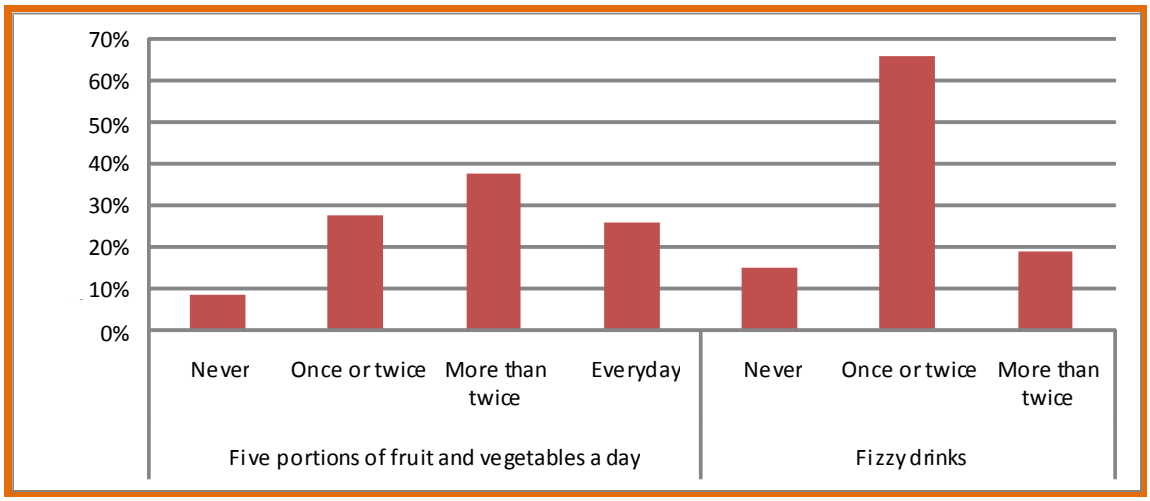
5.7 Lifestyle behaviours among children

A number of lifestyle behaviours of children were investigated in this study. This analysis concentrated on dietary habits of children, their dieting habits, physical activity patterns and life satisfaction.

5.7.1 Dietary habits among children

Dietary habits investigated among children taking part in the study included the frequency of eating five portions of fruit and vegetables per day and the frequency of consumption of fizzy drinks also in the day. Figure 5.12 summarises the findings on these variables. Less than half of the children ate five portions of fruit and vegetables everyday (37.64%) and 8.75% of the children never ate five portions of fruit and vegetables a day. The majority of children (65.9%) consumed a fizzy drink once or twice a day and 15% never consume fizzy drinks.

Figure 5.12 Frequency of eating five portions of fruit and vegetables a day and fizzy drinks consumption in a week.



Other dietary habits investigated included how often children had a meal with their parents/guardians, and whether or not children carried a packed lunch to school (Table 5.27). It was found that almost half of the children (49%) ate a meal with their parents/guardians everyday while only 5% never ate a meal with their parents/guardians at all. Also the majority of children (66%) carry a packed lunch to school. Dietary habits have also been linked to deprivation status.

Table 5.23 summarises the dietary habits of children by deprivation status.

Table 5.23 Dietary habits of children by deprivation status

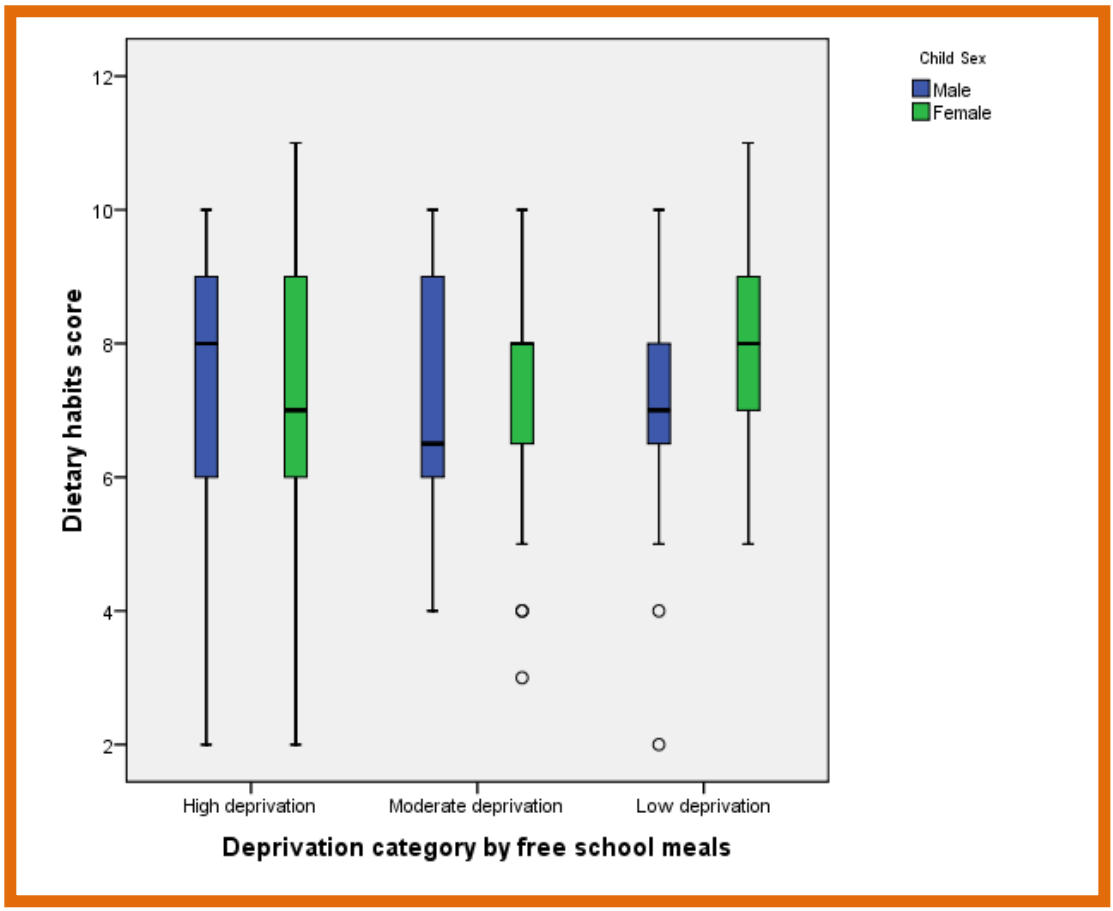
		Deprivation category by percentage free school meals							
		High deprivation		Moderate deprivation		Low deprivation		Total	
		Count	C %	Count	C%	Count	C%	Count	C %
Frequency a child eats five portions of fruit and vegetables a day in a week	Never	12	8.8%	7	12.1%	4	5.8%	23	8.7%
	Once or twice	38	27.9%	18	31.0%	17	24.6%	73	27.8%
	More than twice	50	36.8%	23	39.7%	26	37.7%	99	37.6%
	Every day	36	26.5%	10	17.2%	22	31.9%	68	25.9%
Frequency a child has a fizzy drink in a day	More than twice	30	21.9%	9	15.5%	11	15.9%	50	18.9%
	Once or twice	88	64.2%	40	69.0%	46	66.7%	174	65.9%
	Never	19	13.9%	9	15.5%	12	17.4%	40	15.2%
Frequency a child eats a meal with parents in a week	Never	11	8.0%	2	3.4%	1	1.4%	14	5.3%
	Once a week	16	11.7%	9	15.5%	6	8.7%	31	11.7%
	2 to 3 days	18	13.1%	11	19.0%	18	26.1%	47	17.8%
	4 to 6 days	19	13.9%	7	12.1%	16	23.2%	42	15.9%
	Every day	73	53.3%	29	50.0%	28	40.6%	130	49.2%
Child carries a packed lunch to school	Don't know	2	1.5%	2	3.4%	1	1.4%	5	1.9%
	No	47	34.3%	11	19.0%	27	39.1%	85	32.2%
	Yes	88	64.2%	45	77.6%	41	59.4%	174	65.9%

C% stands for column percentage

By scoring the responses on the items that investigated the dietary habits as described in Section 4.5.6.3, a new variable named the Dietary Habits Score (DHS) was generated. The DHS was highly skewed in the sample as the Kolmogorov-Smirnov test for normality indicated ($Z=2.852$, $p<0.001$). The range of the scores from minimum to maximum was 0 to 11. The median dietary habits score of the children in the sample was 8 scores while the mean was 7 scores and the standard

deviation was 1.8 scores. Figure 5.13 identifies the box and whisker plot for the median dietary habits scores for both boys and girls in the three categories of deprivation.

Figure 5.13 Box and whisker plot of the dietary habits score for boys and girls in the three deprivation categories



The non-parametric Mann-Whitney *U* test was conducted to test the difference in the median dietary habits score between boys and girls. The test identified no difference in dietary habits between boys and girls (Mann-Whitney U=7984, Z= -0.925, $p>0.05$).

In order to test for the difference in median dietary habits score among the three categories of deprivation, the non-parametric Kruskal Wallis *H* test was used. This test also identified no difference in dietary habits among the three categories of deprivation (Chi-square=0.566, df=2, $p>0.05$). Similarly, the test identified no difference in median eating habits score among the categories of actual weight status (Chi-square=3.55, df=3, $p>0.05$), and perceived weight status (Chi-

square=1.735, df=3, p>0.05). This therefore means that self-reported eating habits were not associated with the actual and perceived weight status of children.

On the other hand, the Spearman Rank test identified a weak negative correlation between dietary habits score and total difficulties score (Spearman r= -0.21, p=0.001) as well as conduct problems score (Spearman r= -0.28, p<0.001). The test also identified a weak negative correlation between dietary habits score and emotional symptoms (Spearman r= -0.15, p<0.01). The negative correlation indicates that higher dietary habits scores are matched with lower total difficulties, emotional symptoms and conduct problems scores, which meant that better dietary habits were associated with better mental wellbeing among children.

However some children reported being involved in dieting to bring about weight loss. The next section reports the findings on the dieting habits of the children.

5.7.2 Dieting habits among children

Although dieting was not included in the computation of the eating habits score, almost 1 in 5 children reported being on a diet or doing something else to lose weight. Additionally, a third of the children (30.3%) reported having been on a diet before to try and lose weight. Table 5.24 demonstrates the dieting habits of children by deprivation categories.

Table 5.24 Dieting habits of children by deprivation categories

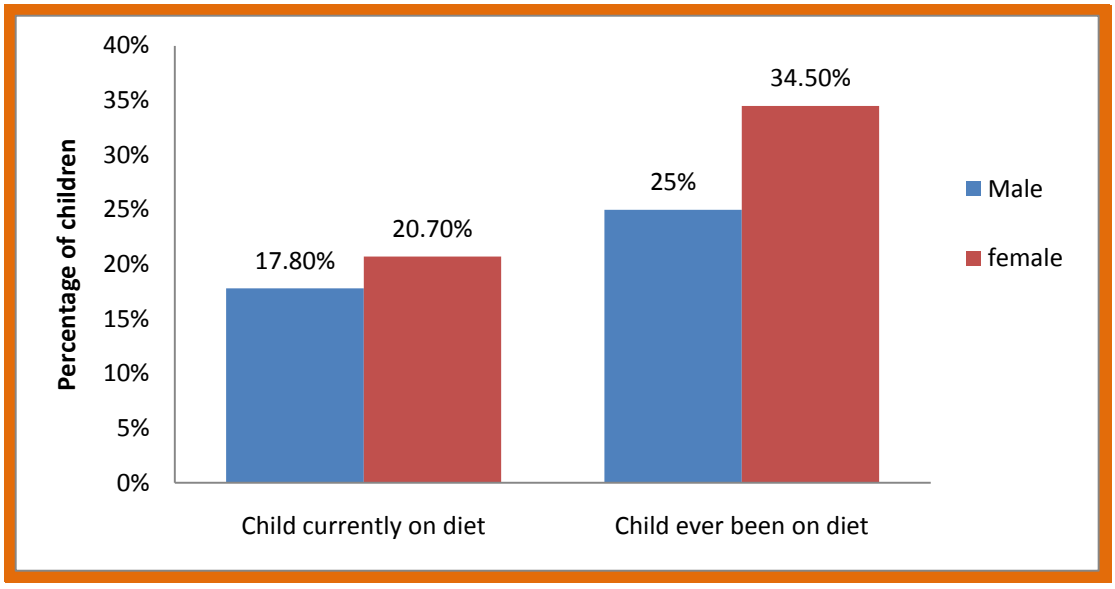
		Deprivation category by percentage free school meals							
		High deprivation		Moderate deprivation		Low deprivation		Total	
		Count	C %	Count	C %	Count	C %	Count	C %
Child dieting or doing something else to lose weight	No, weight is fine	76	55.9%	28	48.3%	45	65.2%	149	56.7%
	No, but should lose some weight	26	19.1%	10	17.2%	9	13.0%	45	17.1%
	No, because should put on weight	9	6.6%	5	8.6%	4	5.8%	18	6.8%
	Yes	25	18.4%	15	25.9%	11	15.9%	51	19.4%
Child ever been on diet to try to lose weight	Yes	43	31.6%	17	30.4%	19	27.5%	79	30.3%
	No	93	68.4%	39	69.6%	50	72.5%	182	69.7%

C% stands for percentage

In order to test for the statistical significance of the relationship between dieting habits and deprivation status, the variable for child dieting was re-coded to generate a binary variable with two categories namely 'yes' and 'no'. The Chi-square test was then conducted which identified no statistical significance for the relationship between dieting habits and deprivation status (χ^2=2.167, df=2, p>0.05). Thus dieting habits among children were not significantly different across the three categories of deprivation.

Dieting among children has also been associated with gender, this analysis investigated the variation in dieting habits between boys and girls. Figure 5.14 summarises the findings.

Figure 5.14 Dieting habits of children by gender



Over a third of the girls (34.5%) reported having been on a diet before whereas just a quarter of boys (25%) reported having been on a diet before. In order to test the statistical significance of the observations, the Chi-square test was conducted. This test identified no association between dieting habits and child gender (χ^2=0.348, df=1, p>0.05).

To test the association between dieting and weight status of children, the Chi-square test was conducted. This test identified an association between actual weight status and the child having been on diet (χ^2=7.88, df=3, p<0.05). Also, the test identified a

strong association between dieting habits and perceived weight status of children (χ^2=17.066, df=3, p=0.001).

To test for the impact of dieting on mental wellbeing of children, the Mann-Whitney *U* test was conducted. This test identified a strong difference in total difficulties between children who were currently on a diet and those who were not (Mann-Whitney *U*=4035, Z=-2.82, p<0.001). This was similar for the emotional symptoms (Mann-Whitney *U*=4251, Z=-2.39, p<0.05), conduct problems (Mann-Whitney *U*=4384, Z=-2.12, p<0.05), peer problems (Mann-Whitney *U*=4099, Z=-2.73, p<0.01), pro-social behaviour (Mann-Whitney *U*=3954, Z=-2.30, p<0.05) and GHQ-12 score (Mann-Whitney *U*=3954, Z=-3.21, p=0001).

5.7.3 Physical activity among children

Physical activity has often been described as a very important part of the energy balance equation. In this study self-reported physical activity was investigated using a questionnaire. Table 5.25 summarises the percentages of children ticking each response on the items that investigated physical activity by deprivation categories. Almost 1 in 5 children reported that they never ride a bicycle at all. A third of the children (27.6%) watched television more than two hours a day. On the other hand 73 (28%) children spent less than one hour watching television. Almost 1 in 10 children never spent any time doing exercises leading to sweating in a week. A third of the children (29.9%) spent about 1 hour per week doing exercises leading to sweating while less than a quarter of the children (21.4%) spent about 7 hours or more per week doing exercises leading to sweating.

Table 5.25 Physical activity among children by deprivation

		Deprivation category by percentage free school meals							
		High deprivation		Moderate deprivation		Low deprivation		Total	
	Categories	Count	C%	Count	C%	Count	C%	Count	C%
Frequency a child rides a bicycle	Never	24	18.0%	8	13.8%	12	17.4%	44	16.9%
	Twice or less a week	46	34.6%	26	44.8%	24	34.8%	96	36.9%
	More than twice a week	63	47.4%	24	41.4%	33	47.8%	120	46.2%
Time a child spends watching television a day	More than two hours a day	42	30.9%	17	29.8%	13	19.1%	72	27.6%
	One to two hours a day	62	45.6%	23	40.4%	31	45.6%	116	44.4%
	Less than one hour a day	32	23.5%	17	29.8%	24	35.3%	73	28.0%
Hours of exercise leading to sweating in a week	None	13	9.6%	5	8.6%	5	7.4%	23	8.8%
	About 1 hour	42	31.1%	15	25.9%	21	30.9%	78	29.9%
	About 2 to 3 hours	34	25.2%	19	32.8%	16	23.5%	69	26.4%
	About 4 to 6 hours	19	14.1%	6	10.3%	9	13.2%	34	13.0%
	About 7 hours or more	27	20.0%	13	22.4%	17	25.0%	57	21.8%
Hours spent playing computer games per day	About 7 hours or more	6	4.4%	1	1.7%	0	0.0%	7	2.7%
	About 4 to 6 hours	6	4.4%	2	3.4%	1	1.5%	9	3.4%
	About 2 to 3 hours	25	18.4%	5	8.6%	8	11.8%	38	14.5%
	About 1 hour	70	51.5%	46	79.3%	49	72.1%	165	63.0%
	None	29	21.3%	4	6.9%	10	14.7%	43	16.4%

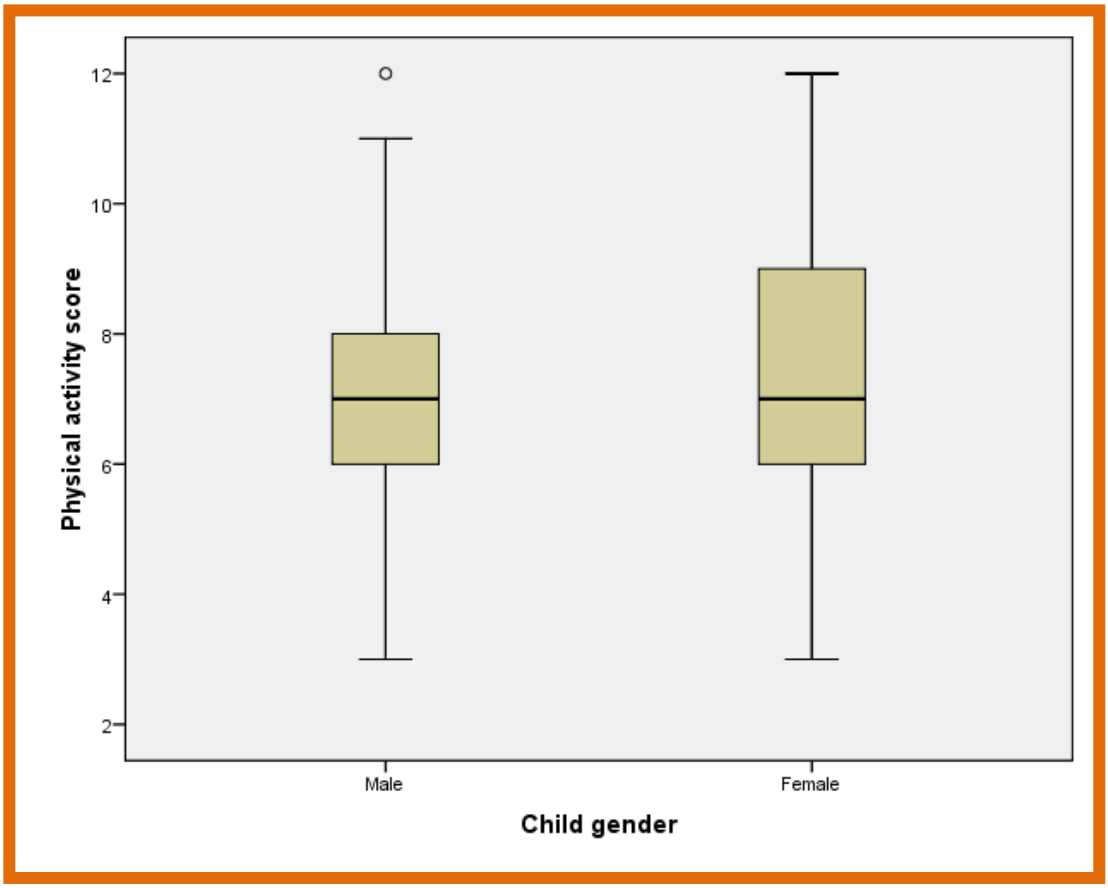
The majority of children (63%) spent about 1 hour per day playing computer games, a very small percentage of children (2.7%) spent about 7 hours or more per day playing computer games and 16.4% of the children never spent any time playing computer games.

The items investigating physical activity were scored as described in Section 4.5.6.3 to generate a continuous variable known as the Physical Activity Score (PAS). The Kolmogorov-Smirnov test for normality indicated that the physical activity score was not normally distributed in the sample ($Z=1.759$, $p<0.01$). The median physical activity score was 7 and the scores ranged from 3 to 12. The higher the score was the better the physical activity.

There has been speculation about the association between physical activity and deprivation status. This analysis investigated this speculation by using the non-parametric Kruskal-Wallis *H* test to investigate the difference in the physical activity score among the categories of deprivation. This test indicated no evidence for the difference in physical activity score among the categories of deprivation (Chi-square=3.11, df=2, $p<0.05$).

But physical activity has also been linked to gender. This analysis investigated the link between physical activity and gender. Figure 5.15 is a box plot indicating the comparison between the physical activity in boys and girls. The median physical activity score for both boys and girls was similar and it was 7 scores. The spread in physical activity scores among girls was wider than that among boys. However boys had an outlying physical activity score which was not included in the range.

Figure 5.15 The box and whisker plot for physical activity score for boys and girls



In order to test the statistical significance of the observed similarity in the physical activity score between boys and girls, a Mann-Whitney *U* test was conducted. This test indicated no statistical difference in median physical activity score between boys and girls (Mann-Whitney U=6849, Z= -1.895, p>0.05). Upon analysing the association between child gender and each item investigating physical activity, it was identified that gender was very significantly associated with the number of hours children spent playing computer games. A Chi-square test conducted between gender and the number of hours children spend playing computer games identified a strong association between the two variables (χ^2=24.073, df=4, p<0.001). Boys were more likely to spend longer hours playing computer games compared to girls.

To test for the impact of self-reported physical activity on weight status of children, the Kruskal Wallis *H* test was conducted. This test identified no evidence for the

difference in median physical activity score among the categories of actual weight status (Chi-square=2.28, df=3, p>0.05) and perceived weight status (Chi-square=3.243, df=3, p>0.05). This therefore means that self-reported physical activity had no impact on the actual weight status and perceived weight status of children.

To test for the impact of self-reported physical activity on mental wellbeing of children, the Spearman rank test was conducted. It identified a weak negative correlation between the physical activity score and total difficulties (Spearman r= -0.21, p=0.001), conduct problems (Spearman r= -0.22, p=0.001) and hyper-activity problems (r= -0.18, p<0.01). These findings indicate that higher physical activity levels are strongly associated with better mental wellbeing.

5.7.4 Life satisfaction among children

All children (N=264) responded to the items investigating life satisfaction on the questionnaire. Table 5.26 summarises the percentages of children ticking each response on the items that investigated life satisfaction by deprivation categories. About a quarter of the children (26%) perceived themselves as very good looking, 1 in 20 children perceived themselves as being not very good looking. A very small percentage of children (3%) felt not happy at all while the majority of children (57.8%) felt very happy. A quarter of the children (25.9%) sometimes felt helpless, 28.1% of the children sometimes felt left out of things.

The items investigating life satisfaction were scored as described in Section 4.5.6.3 to generate a continuous variable known as the Life Satisfaction Score (LSS). The Kolmogorov-Smirnov test for normality indicated that the life satisfaction score was not normally distributed in the sample (Z=1.832, p<0.01). The median life satisfaction score was 11 sores and the scores ranged from 0 to 15. The higher the score, the better the life satisfaction.

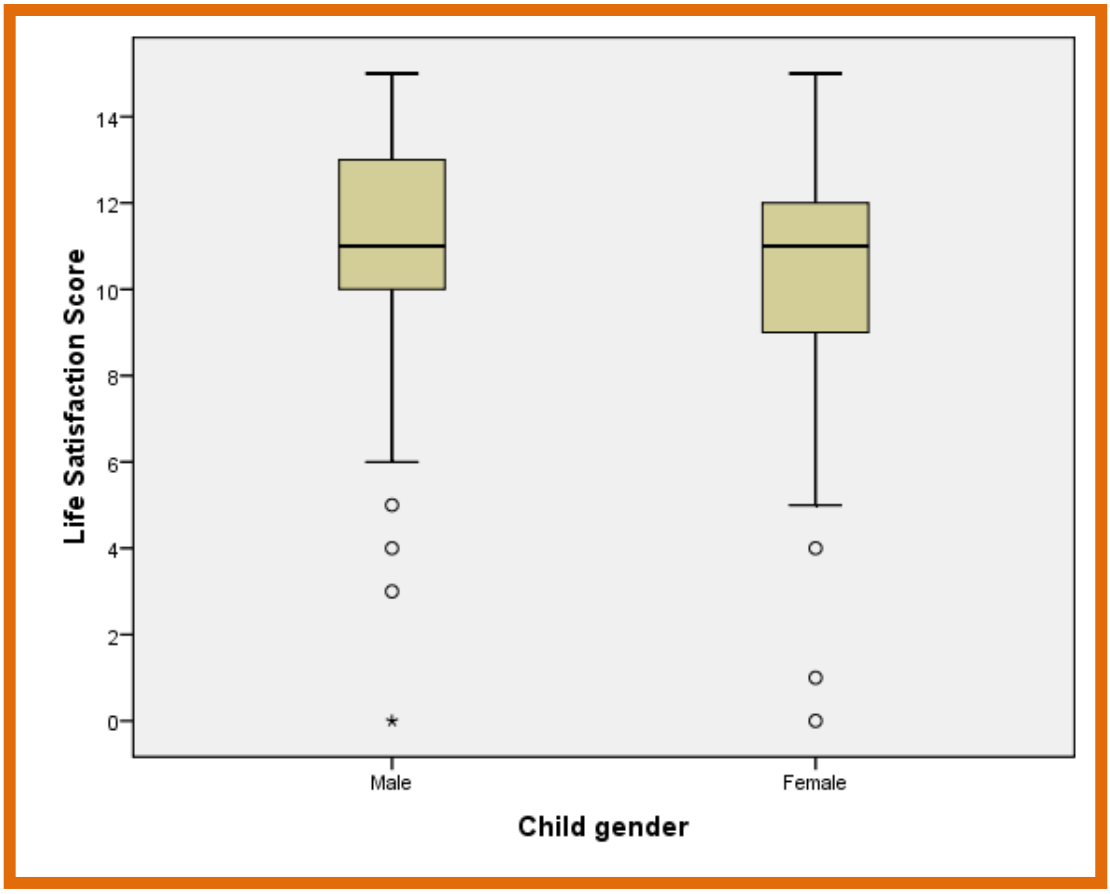
Table 5.26 Life satisfaction among children by deprivation

		Deprivation category by percentage free school meals							
		High deprivation		Moderate deprivation		Low deprivation		Total	
		Count	C %	Count	C %	Count	C %	Count	C%
Self-perception	Don't think about my looks	12	8.9%	9	15.5%	6	8.7%	27	10.3%
	Not very good looking	8	5.9%	5	8.6%	3	4.3%	16	6.1%
	About average	39	28.9%	19	32.8%	17	24.6%	75	28.6%
	Quite good looking	38	28.1%	11	19.0%	27	39.1%	76	29.0%
	Very good looking	38	28.1%	14	24.1%	16	23.2%	68	26.0%
General feeling about life at present	Not happy at all	5	3.6%	2	3.4%	1	1.5%	8	3.0%
	Don't feel very happy	7	5.1%	4	6.9%	2	2.9%	13	4.9%
	Feel quite happy	50	36.5%	19	32.8%	21	30.9%	90	34.2%
	Feel very happy	75	54.7%	33	56.9%	44	64.7%	152	57.8%
How often the child feels helpless	Always	3	2.2%	1	1.7%	1	1.4%	5	1.9%
	Often	11	8.1%	2	3.4%	2	2.9%	15	5.7%
	Sometimes	36	26.5%	13	22.4%	19	27.5%	68	25.9%
	Hardly ever	47	34.6%	16	27.6%	27	39.1%	90	34.2%
	Never	39	28.7%	26	44.8%	20	29.0%	85	32.3%
How often the child feels left out of things	Always	4	2.9%	4	6.9%	2	2.9%	10	3.8%
	Often	14	10.3%	7	12.1%	2	2.9%	23	8.7%
	Sometimes	40	29.4%	11	19.0%	23	33.3%	74	28.1%
	Hardly ever	47	34.6%	18	31.0%	19	27.5%	84	31.9%
	Never	31	22.8%	18	31.0%	23	33.3%	72	27.4%

Life satisfaction has been linked to deprivation. In this analysis the Kruskal-Wallis *H* test was conducted to investigate the variation in life satisfaction across all the three categories of deprivation. This test identified no difference in life satisfaction among children in the three categories of deprivation (Chi-Square=1.517, df=2, p>0.05).

This analysis also investigated the link between life satisfaction and gender. Figure 5.16 is a box plot indicating the comparison between life satisfaction in boys and girls. The median life satisfaction score for both boys and girls was similar and it was 11 scores. The spread in life satisfaction scores among girls was wider than that among boys. Both boys and girls had outlying life satisfaction scores which were not included in the range.

Figure 5.16 The box and whisker plot for Life Satisfaction Score (LSS) for boys and girls



In order to test the statistical significance of the observed similarity in the life satisfaction score between boys and girls, a Mann-Whitney *U* test was conducted. This test indicated no difference in median life satisfaction score between boys and

girls (Mann-Whitney *U*=7274, Z= -1.822, p>0.05). The results of this test however almost approached statistical significance (p=0.069).

Upon analysing the association between child gender and each item investigating life satisfaction, it was identified that child gender was very significantly associated with self-perception. A Chi-square test conducted between gender and self-perception identified very strong evidence for the association between the two variables (χ^2=18.47, df=4, p=0.001). Boys were more likely to perceive themselves as very good looking while girls were more likely to perceive themselves as not very good looking.

The Chi-square test was conducted to investigate the impact of life satisfaction on the weight status of children. The test identified no difference in median life satisfaction score (Chi-square=0.31, df=3, p>0.05) among the categories of actual weight status. However, there was a strong difference in median life satisfaction score among the four categories of perceived weight status (Chi-square=14.98, df=3, p<0.01). This indicates that life satisfaction is associated with perceived weight status.

To test the impact of life satisfaction on the mental wellbeing of children, the Spearman rank test was conducted. This test indicated a weak negative correlation between life satisfaction and the following indicators of mental wellbeing: total difficulties (Spearman r= -0.38, p<0.001), emotional problems (Spearman r= -0.41, p<0.001), hyperactivity problems (Spearman r= -0.19, p<0.01), and peer problems (Spearman r= -0.36, p<0.001). These findings indicate that better life satisfaction is strongly associated with better mental wellbeing

Having presented the findings for lifestyle behaviours, it is important to identify the findings about social support patterns for children as it is a factor thought to have a strong bearing on weight status and mental wellbeing among children. The next section presents the findings on social support patterns for children.

5.8 Social support patterns for children

The social support children receive in their communities was investigated by use of the indicators of family support, peer support and school support on the questionnaire. All children (N=264) responded to these indicators. Table 5.27 summarises the responses of the children on each item investigating family, peer

and school support. In terms of school support, less than half of the children (40.7%) liked their school a lot, most children (46%) only liked school a bit and about 1 in 10 children didn't like school very much while a very small percentage (4.2%) did not like school at all. Most children (42.2%) thought that their class teacher perceived their performance at school to be good while a very small percentage (2.7%) thought that their class teacher perceived their performance to be below average.

Table 5.27 Indicators of parental, peer and school support for children

		Mean	Median	Minimum	Maximum	Count	C%
Social support score		16	17	5	25		
Days a child spends with friends after school		3	3	0	5		
Child's feeling about school	Don't like it at all					11	4.2%
	Don't like it very much					24	9.1%
	Like it a bit					121	46.0%
	Like it a lot					107	40.7%
How easy a child finds it to talk to best friend about things that bother him/her	Very difficult					20	7.6%
	Difficult					46	17.4%
	Easy					97	36.7%
	Very easy					101	38.3%
How often a child contacts friend(s) on phone or Internet	Never					59	22.4%
	1 or 2 days a week					65	24.7%
	3 or 4 days a week					58	22.1%
	5 or 6 days a week					27	10.3%
	Every day					54	20.5%
Perceived class teachers opinion about child performance	Below average					7	2.7%
	Average					51	19.9%
	Good					108	42.2%
	Very good					90	35.2%
How easy a child finds it to talk to parents/guardians	Very Difficult					15	5.7%
	Difficult					59	22.4%
	Easy					82	31.2%
	Very easy					107	40.7%
Child finds most pupils in class kind and helpful	Disagree a lot					12	4.6%
	Disagree a bit					4	1.5%
	Neither agree nor disagree					24	9.1%
	Agree a bit					120	45.6%
	Agree a lot					103	39.2%

Regarding peer support, about 1 in 5 children found it difficult to talk to their best friends about things bothering them, although 38.3% of the children found it very easy. Similarly 1 in 5 children never contacted their friend(s) on phone or Internet, whereas a fifth of the children did it every day. About 1 in 20 children did not find most pupils in class kind and helpful at all, although most children (45.6%) found most pupils in class kind and helpful a bit. The average number of days children spent with friends after school was 3 with the days ranging from 0 to 5. In respect of family support, 1 in 5 children found it difficult to talk to their parents/guardians while most children (40.7%) found it very easy to speak to their parents/guardians.

The indicators of social support described above were scored as described in Section 4.5.6.3 to generate another continuous variable known as the Social Support Score (SSS). The Kolmogorov-Smirnov test for normality indicated that social support was not normally distributed in the sample ($Z=1.47$, $p<0.05$). The median social support score was 17, with scores ranging between 5 and 25. The higher the score, the better the social support a child received.

The analysis investigated the link between social support and deprivation status of the children by percentage free school meals of their schools. Table 5.28 summarises the indicators of social support by deprivation status.

Table 5.28 Indicators of social support by deprivation category

		Deprivation category by percentage free school meals					
		High deprivation		Moderate deprivation		Low deprivation	
		Count	C%	Count	C %	Count	C%
Child's feeling about school	Don't like it at all	7	5.1%	0	0.0%	4	5.8%
	Don't like it very much	11	8.1%	5	8.6%	8	11.6%
	Like it a bit	61	44.9%	34	58.6%	26	37.7%
	Like it a lot	57	41.9%	19	32.8%	31	44.9%
How easy a child finds it to talk to best friend about things that bother him/her	Very difficult	13	9.5%	4	6.9%	3	4.3%
	Difficult	26	19.0%	7	12.1%	13	18.8%
	Easy	50	36.5%	22	37.9%	25	36.2%
	Very easy	48	35.0%	25	43.1%	28	40.6%
How often a child contacts friend(s) on phone or Internet	Never	33	24.3%	13	22.4%	13	18.8%
	1 or 2 days a week	35	25.7%	10	17.2%	20	29.0%
	3 or 4 days a week	27	19.9%	14	24.1%	17	24.6%
	5 or 6 days a week	10	7.4%	7	12.1%	10	14.5%
	Every day	31	22.8%	14	24.1%	9	13.0%
Perceived class teachers opinion about child performance	Below average	3	2.3%	3	5.4%	1	1.4%
	Average	23	17.6%	9	16.1%	19	27.5%
	Good	50	38.2%	31	55.4%	27	39.1%
	Very good	55	42.0%	13	23.2%	22	31.9%
How easy a child finds it to talk to parents/guardians	Very Difficult	11	8.1%	4	6.9%	0	0.0%
	Difficult	31	22.8%	14	24.1%	14	20.3%
	Easy	39	28.7%	22	37.9%	21	30.4%
	Very easy	55	40.4%	18	31.0%	34	49.3%
Child finds most pupils in class kind and helpful	Disagree a lot	6	4.4%	3	5.2%	3	4.3%
	Disagree a bit	0	0.0%	4	6.9%	0	0.0%
	Neither agree nor disagree	16	11.8%	6	10.3%	2	2.9%
	Agree a bit	52	38.2%	29	50.0%	39	56.5%
	Agree a lot	62	45.6%	16	27.6%	25	36.2%

The Kruskal-Wallis *H* test was conducted to test the difference in median social support score among the three classes of deprivation status. This test identified no difference in median social support score among the three classes of deprivation status (Chi-square=3.136, df=2, p>0.05). This indicates that social support does not differ among children whether living in highly, moderately or low deprived areas. However when each of the indicators of social support was tested individually using the Chi-square test, it was found that there is a significant association between deprivation status and the child finding most pupils in class kind and helpful (χ^2=25.5, df=8, p=0.001). Children in highly deprived areas were more likely to find most pupils in class kind and helpful. The Chi-square test also identified evidence for the association between deprivation status and the time a child spends with friends after school (χ^2=18.93, df=10, p<0.05). Children in low deprived areas were more likely to spend more time with friends after school.

The analysis also investigated the link between social support and gender of children. Table 5.29 summarises the findings on the indicators of social support by gender. The median social support score for girls was higher than that for boys. Compared to girls, boys were more likely to feel that their class teacher perceived their performance at school as below average. The percentage of boys finding it very easy to talk to their parents/guardians (48.7%) was higher than for girls (34.2%). Boys were twice more likely to find it very difficult to talk to their best friends about things that bothered them. Also the percentage of boys who never contacted a friend on phone or the Internet (34.2%) was thrice the percentage for girls (13%). Girls were more likely to find most pupils in class kind and helpful compared to boys.

Table 5.29 Indicators of social support by gender

		Child gender							
		Male				Female			
		Median	Range	Count	C%	Median	Range	Count	C %
Social support score		16	20			17	16		
Time a child spends with friends after school		3	5			3	5		
Perceived class teachers opinion	Below average			6	5.3%			1	0.7%
	Average			30	26.3%			21	14.8%
	Good			48	42.1%			60	42.3%
	Very good			30	26.3%			60	42.3%
How easy a child finds it to talk to parents/guardians	Very Difficult			7	6.0%			8	5.5%
	Difficult			21	17.9%			38	26.0%
	Easy			32	27.4%			50	34.2%
	Very easy			57	48.7%			50	34.2%
How easy a child finds it to talk to best friend about things that bother him/her	Very difficult			13	11.0%			7	4.8%
	Difficult			19	16.1%			27	18.5%
	Easy			39	33.1%			58	39.7%
	Very easy			47	39.8%			54	37.0%
How often a child contacts friend(s) on phone or Internet	Never			40	34.2%			19	13.0%
	1 or 2 days a week			31	26.5%			34	23.3%
	3 or 4 days a week			24	20.5%			34	23.3%
	5 or 6 days a week			6	5.1%			21	14.4%
	Every day			16	13.7%			38	26.0%
Child finds most pupils in class kind and helpful at baseline	Disagree a lot			9	7.7%			3	2.1%
	Disagree a bit			3	2.6%			1	.7%
	Neither agree nor disagree			13	11.1%			11	7.5%
	Agree a bit			48	41.0%			72	49.3%
	Agree a lot			44	37.6%			59	40.4%

In order to test the statistical significance of the observed difference in the median social support score between boys and girls, a Mann-Whitney *U* test was conducted. The test identified strong evidence for the difference in median social support scores between boys and girls (Mann-Whitney U=6228, Z= -3.08, $p<0.01$). But the

association of each indicator of social support with gender was tested using the Chi-square and Table 5.30 summarises the findings.

Table 5.30 Chi-square test for the indicators of social support and child gender

Indicators of social support	N	Chi-Square(χ^2)	df	p-value (Sig. 2-sided)
Perceived class teacher opinion	256	13.593	3	0.004
Communication with parents/guardians	256	6.252	3	0.100
Support from peers	256	8.051	4	0.090
Interaction with friends after school	256	3.132	5	0.680
Communication with the best friend	256	4.479	3	0.214
Contacting peers on phone/internet	256	23.724	4	0.000

df stands for degrees of freedom

The test identified a strong association between perceived class teacher's opinion of the child's performance and gender (χ^2=13.593, df=3, p<0.01). Boys were more likely to feel that their class teacher perceived their performance as below average while girls were more likely to feel that their class teacher perceived their performance as very good. The test also identified a strong association between the frequency of a child contacting their friends on the phone/internet, and child gender (χ^2=23.724, df=4, p<0.001). Girls were more likely to spend more days contacting friends on the phone/internet compared with boys.

In order to investigate the impact of social support on the actual and perceived weight status of the children, the Kruskal-Wallis *H* test was conducted for the skewed variables (overall social support, school support and family support) and the one-way analysis of variances (ANOVA) for the normally distributed variable (peer support). Table 5.31 below summarises the findings of these tests.

Table 5.31 The Kruskal-Wallis *H* test and the one-way ANOVA for the impact of the variables of social support on child weight status

	Actual weight status					Perceived weight status				
	N	Chi-square	F-Stat	df	p-value	N	Chi-square	F-Stat	df	p-value
Overall social support	81	1.67		3	0.64	254	20.102		3	0.000
Peer support	82		0.25	3	0.86	260		3.52	3	0.016
Family support	82	4.40		3	0.22	262	10.986		3	0.012
School support	81	1.14		3	0.77	255	11.991		3	0.007

F-stat stands for the ANOVA F- statistic.

The results of the tests indicated no difference in the median overall social support score (Chi-square=1.67, df=3, p>0.05), peer support score (F=0.25, df=3, p>0.05), family support score (Chi-square=4.4, df=3, p>0.05) and school support score (Chi-square=1.14, df=3, p>0.05) among the categories of actual weight status of children estimated from height and weight measurements reported by the PCT. This suggests that peer support, family support, school support and overall support has no relationship with the actual weight status of the children.

Conversely, there was strong evidence for the difference in median overall social support score among the four categories of perceived weight status of the children (Chi-square= 20.102, df=3, p<0.001). The one-way ANOVA also indicated evidence for the difference in the mean peer support score among the categories of perceived weight status (F=3.52, df=3, p<0.05). The Kruskal Wallis *H* test identified evidence for the difference in median family support score among the categories of perceived weight status (Chi-square=10.986, df=3, p<0.05). Similarly, there was strong evidence for the difference in median school support score among the categories of perceived weight status (Chi-square=11.991, df=3, p<0.01). These findings indicate that social support is associated with perceived weight status of children.

The impact of social support on mental wellbeing of children was investigated by testing the statistical significance of the correlation between different dimensions of social support and the indicators of mental wellbeing. Table 5.32 identifies the findings from this test.

Table 5.32 Correlation between social support and indicators of mental wellbeing for children

	Social support							
	Overall social support		Peer support		Family support		School support	
	Spearman, r	p-value	Pearson, r	p-value	Spearman, r	p-Value	Spearman, r	p-value
Total difficulties	-0.31	0.000	-0.22	0.000	-0.13	0.000	-0.26	0.000
Emotional problems	-0.17	0.005	-0.16	0.012	-0.15	0.018	-0.05	0.463
Conduct problems	-0.21	0.001	-0.10	0.096	-0.04	0.548	-0.32	0.080
Hyper-activity	-0.17	0.008	-0.06	0.308	-0.05	0.445	-0.39	0.000
Peer problems	-0.31	0.000	-0.31	0.000	-0.10	0.099	-0.02	0.700
Pro-social behaviour	0.24	0.000	0.14	0.028	-0.07	0.254	0.38	0.000
GHQ-12 total score	-0.30	0.000	-0.25	0.000	-0.16	0.010	-0.15	0.015

The Spearman rank test identified a weak negative correlation between overall social support and total difficulties (Spearman r= -0.31, p<0.001), emotional symptoms (Spearman r= -0.17, p<0.01), conduct problems (Spearman r= -0.21, p=0.001), hyper-activity problems (Spearman r= -0.17, p<0.01) and peer problems (Spearman r= -0.31, p<0.001). Better overall social support is associated with better mental wellbeing.

The Pearson's correlation coefficient test identified a weak negative correlation between peer support and total difficulties (Pearson r= -0.22, p<0.001), and peer problems (Pearson r= -0.31, p<0.001). The test also identified a weak negative correlation between peer support and emotional symptoms (Pearson r= -0.16, p<0.05). The test identified a weak positive correlation between peer support and pro-social behaviour (Pearson r= 0.14, p<0.05) and a negative correlation between peer support and mental wellbeing determined by the GHQ-12 (Pearson r= -0.25, p<0.001).

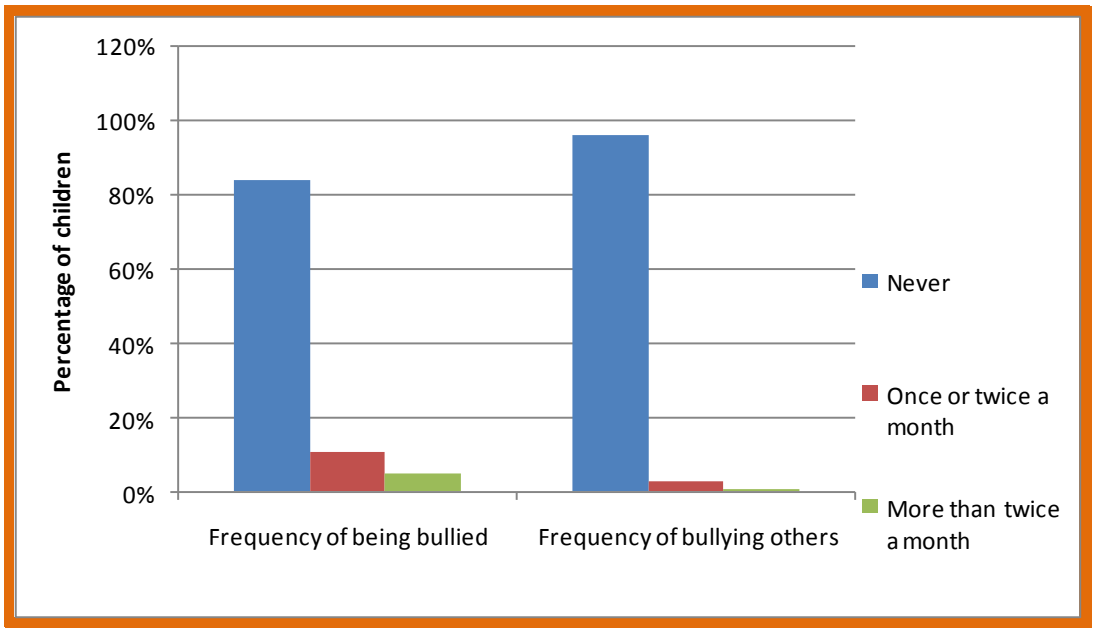
Additionally, the Spearman rank test identified a little negative correlation between family support and total difficulties among children (Spearman r= -0.13, p<0.001), it also identified a weak negative correlation between family support and emotional symptoms (Spearman r= -0.15, p<0.05). There was however no significant association between family support and conduct problems (Spearman r= -0.04,

p>0.05), hyper-activity problems (Spearman r= -0.05, p>0.05), peer problems (Spearman r= -0.10, p>0.05) and pro-social behaviour (Spearman r= -0.07, p>0.05).

There was a weak negative correlation between school support and total difficulties (Spearman r= -0.26, p<0.001), conduct problems (Spearman r= -0.32, p<0.001) and hyper-activity problems (Spearman r= -0.39, p<0.001). Higher school support is significantly associated with better mental wellbeing among children. Also there was a positive correlation between school support and pro-social behaviours (Spearman r= 0.38, p<0.001) and a moderate positive correlation between school support and mental wellbeing determined from the GHQ-12 (Spearman r= 0.16, p<0.01).

Contrary to receiving support from society, some children reported being bullied. Figure 5.17 summarises the findings on bullying. The majority of children (84.1%) reported never having been bullied due to their weight status. However 1 in 10 children had been bullied once or twice a month because of their weight status and 1 in 20 children had been bullied more than twice a month because of their weight status. On the other hand almost all children reported never having participated in bullying another child due to their weight status (96.2%).

Figure 5.17 Weight related bullying among children



This analysis also investigated the association between weight related bullying and gender. A Chi-square test was conducted between gender and frequency of being bullied. This test identified no association between gender and frequency of being bullied (χ^2=5.781, df=2, p>0.05). However the results of this test nearly approached

significance (p=0.056). In order to investigate the association between weight related bullying and deprivation status, a Chi-square test was conducted. This test identified a strong association between weight related bullying and deprivation status (χ^2=13.955, df=4, p<0.01).

5.9 Impact of socio-demographic factors on weight status of children

It was of particular interest to investigate the impact of different socio-demographic factors on the weight status of children. However it was assumed that socio-demographic factors would impact differently on the actual weight status of children and on the perceived weight status of children, as the next sections identify.

5.9.1 Impact of socio-demographic characteristics on the actual weight status

The Chi-square test was conducted to investigate the relationship between different socio-demographic characteristics and actual weight status. Table 5.33 summarises the findings of this test.

Table 5.33 The Chi-Square test for the association between socio-demographic characteristics and actual weight status of children

Socio-demographic characteristic	N	Chi-Square(χ^2)	df	p-value (Sig. 2-sided)
Age range of parents/guardians	82	16.66	12	0.163
Child gender	82	1.06	3	0.787
Gender of parents	82	4.095	3	0.251
Dad employed	82	3.812	3	0.283
Mum employed	82	1.23	3	0.746
Deprivation status	82	10.45	6	0.107
Parent's highest education level	79	19.27	12	0.082
Ethnicity	82	5.89	12	0.921
Occupation of main household earner	82	13.30	12	0.348
Number of people living in the home	82	23.76	6	0.001

df stands for degrees of freedom

Most of the demographic characteristics were not significantly associated with actual weight status of children (p>0.05). However, the Chi-square test identified a strong association between the number of people living in the home and actual weight status of the children (χ^2=23.76, df=6, p=0.001).

5.9.2 Impact of socio-demographic characteristics on perceived weight status

A Chi-square test was also conducted to investigate the association between socio-demographic characteristics and the perceived weight status of children. Table 5.34 summarises the findings of this test.

Table 5.34 The Chi-Square test for the association between socio-demographic characteristics and perceived weight status of children

Socio-demographic characteristic	N	Chi-Square(χ^2)	df	p-value (Sig. 2-sided)
Age range of parents/guardians	115	18.908	12	0.910
Child gender	263	2.510	3	0.473
Gender of parents	115	0.517	3	0.915
Dad employed	259	3.879	3	0.275
Mum employed	262	2.478	3	0.479
Deprivation status	263	2.554	6	0.862
Parent's highest education level	110	19.184	12	0.084
Ethnicity	114	11.591	12	0.479
Occupation of main household earner	108	9.439	12	0.665
Number of people living in the home	115	2.547	6	0.863

df stands for degrees of freedom

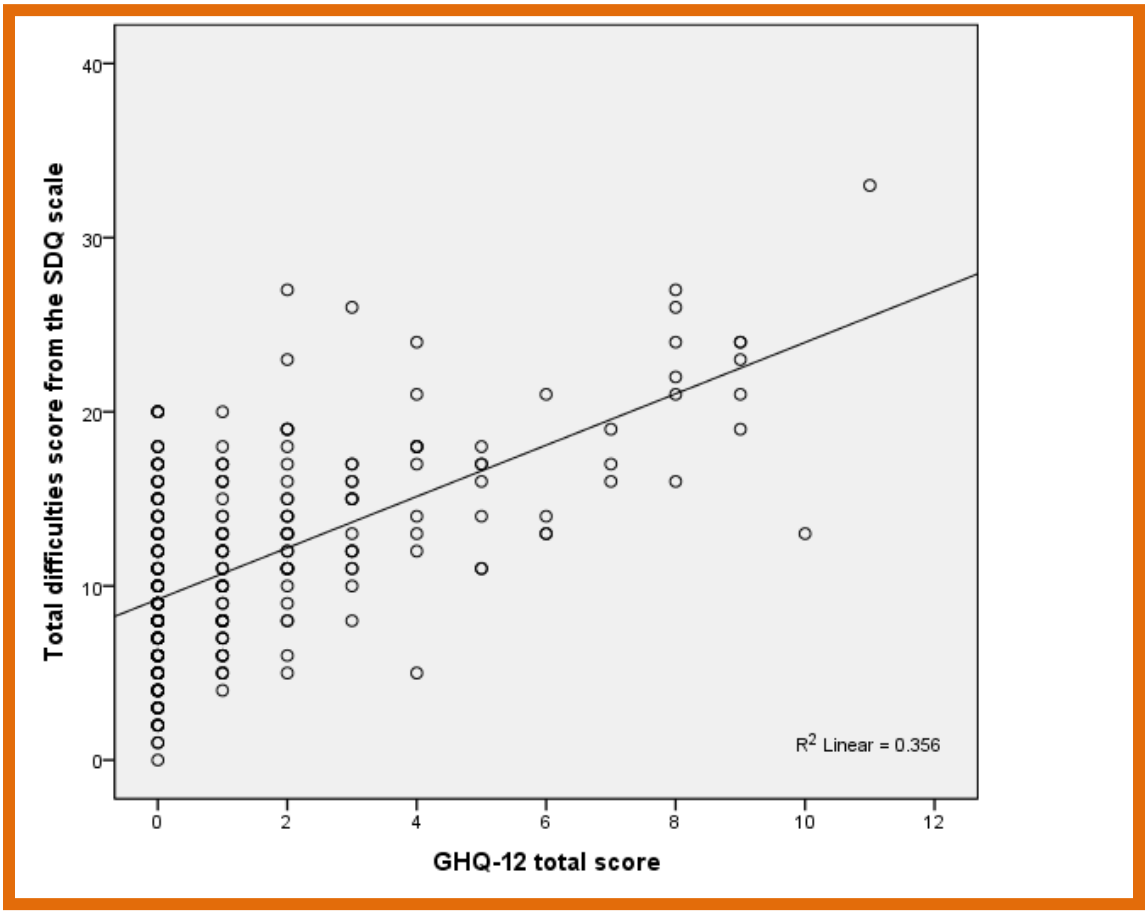
The Chi-square test did not find evidence for the association between any of the socio-demographic characteristics listed in Table 5.38 above and perceived weight status ($p>0.05$).

Of note, Chi-square tests did not identify any association between socio-demographic factors and mental wellbeing of children ($p>0.05$).

5.10 Correlation between the SDQ and GHQ-12 in measuring mental wellbeing among children.

Two scales were used in this study to determine mental wellbeing of children. It was therefore of interest to determine the correlation between these two scales in determining mental wellbeing among children. In order to identify the nature of the relationship between the scores from the SDQ and those from the GHQ, scatter plots were drawn. Figure 5.18 indicates the scatter plot between the SDQ total difficulties score and the GHQ-12 total score.

Figure 5.18 The scatter plot for SDQ total difficulties score and GHQ-12 score



The scatter plot indicates a positive relationship between the SDQ total difficulties score and the GHQ-12 total score. It should be noted that higher SDQ total difficulties scores and GHQ-12 total scores are associated with poor mental wellbeing. This positive relationship indicates that the SDQ perfectly correlates with the GHQ-12 in determining mental wellbeing in children. However in order to identify whether or not these observations are statistically significant, the Spearman rank correlation coefficient test was conducted. This test indicated a strong statistically significant positive correlation between the SDQ-total difficulties score and the GHQ-12 total score (Spearman correlation coefficient, r= 0.53 (262), p<0.001).

But the significant question is whether the GHQ-12 correlates well with the sub-scales of the SDQ that determine specific indicators of mental wellbeing such as emotional symptoms, conduct problems etc. The analysis indicated a moderate positive correlation between the GHQ-12 total score and the SDQ-emotional symptoms score (Spearman correlation coefficient, r= 0.52 (262), p<0.001); the SDQ-conduct problems score (Spearman correlation coefficient, r= 0.21 (262),

p<0.001); the SDQ-hyper-activity problems score (Spearman correlation coefficient, r= 0.28 (262), p<0.001); and the SDQ-peer problems score (Spearman correlation coefficient, r= 0.43 (262), p<0.001). Box 5.4 presents the summary of key findings regarding lifestyle behaviours and the correlation between the SDQ and the GHQ-12.

Box 5.4 Summary of key findings regarding lifestyle behaviours and the correlation between the SDQ and the GHQ-12

- Less than half of the children ate five portions of fruit and vegetables every day. About 1 in 10 children never ate five portions of fruit and vegetables at all.
- The majority of the children took fizzy drinks once or twice a day.
- Just half of the children reported eating a meal with parents/guardians every day.
- Dietary habits did not differ between boys and girls. The difference in dietary habits among categories of deprivation was not statistically significant.
- Better dietary habits among children were significantly associated with better mental wellbeing.
- 1 in 5 children reported having been on a diet to try and lose weight. Dieting habits were not significantly associated with deprivation status.
- Children who perceived themselves to be overweight were more likely to report having been on a diet.
- Children on a diet were more likely to have poor mental wellbeing.
- 1 in 10 children never spent any time during the week doing exercise leading to sweating.
- A third of children watched television more than two hours per day. Self-reported physical activity levels did not differ between boys and girls.
- Self-reported physical activity was not significantly associated with weight status among children.
- Higher physical activity levels were strongly associated with better mental wellbeing.
- 1 in 5 children reported finding it difficult to talk to their parent/guardians about things that bother them.
- 1 in 10 children reported having been bullied once or twice because of their weight status.
- Socio-demographic factors were not significantly associated with perceived weight status and mental wellbeing
- The GHQ-12 was moderately correlated with the SDQ-25 in measuring mental health among children.

Chapter 6 – QUALITATIVE FINDINGS

6.1 Introduction

This chapter presents the findings from the interviews conducted with a sub-sample of children and parents/guardians. Throughout the chapter verbatim examples have been used to support the themes and arguments derived from the interviews. This chapter sets the scene by describing the demographic characteristics of the participants who took part in the interviews. A brief mention is made about the major themes that came out of the interview data before fully discussing each of the themes in detail. The findings in this chapter have been discussed in relation to the available literature. This approach has been chosen because it is considered to be the best in enhancing the logical flow of findings from qualitative interviews (Burnard, 1991). This chapter has been organised to include boxes summarising the key messages at the end of each major theme.

6.2 Socio-demographic characteristics of the interview sample

One-to-one semi-structured interviews were conducted with 21 children and 16 parents/guardians. There were five children whose parents/guardians did not opt to be interviewed; thus the findings in this chapter have been based on 16 interviews from both parents/guardians and their children, and five interviews from only the children. Out of the 16 parents, seven received a letter from the PCT indicating that their children were either overweight or obese, eight received a letter indicating that their children were the ideal weight and one received a letter indicating that the child was underweight. Out of the 21 children, seven had been identified as overweight or obese. Table 6.1 below summarises the socio-demographic characteristics of the interview sample (parents/guardians and children). The average age of children who took part in these interviews was 10 years. The majority of the children were female (66.7%). Most children (53.3%) who took part in the interviews came from schools in areas of considerable deprivation, when eligibility for free school meals is taken as the surrogate measure for deprivation. Of note, most of the parents/guardians were mainly professionals.

Table 6.1 Socio-demographic characteristics of the interview sample

Socio-demographic characteristic	Category	Children		Parents/guardians	
		N	%	N	%
Gender	Male	7	33.3%	3	18.75%
	Female	14	66.7%	13	81.25%
Deprivation status by percentage free school meals	High	13	61.9%	8	53.3%
	Moderate	2	9.5%	2	13.3%
	Low	6	28.6%	5	33.3%
Parent/guardian highest level of education	GCSEs/O-levels			3	23.1%
	A-levels/Diploma			6	46.2%
	University degree			4	30.8%
Parent/guardian age range	< 31 years			1	7.7%
	31-40 years			5	38.5%
	41-50 years			6	46.2%
	> 50 years			1	7.7%
Occupation of main house hold earner	Unemployed			0	0.0%
	Unskilled labourer			1	7.7%
	Skilled labourer			4	30.8%
	Professional job			8	61.5%
Ethnicity	White British	21	100%	15	100%

6.3 Major themes

Thematic analysis of the parental and child interviews yielded seven major themes. Each of these themes has been discussed fully in the sections that follow. The major themes that were developed included:

- Feeding back child weight status results
- Challenges of parenting in contemporary society
- The 'obesogenic environment'; a challenge for childhood obesity control
- Accessing help within the health system subsequent to weight feedback from the measurement process
- Enhancing awareness of weight problems for behavioural change
- Impact of the measurement process on mental wellbeing of children
- Challenges of the measurement programme

Tables 6.2 and 6.3 below indicate the seven major themes and how participants' (parents/guardians and children) accounts contributed towards the development of each of the themes. Child weight status has been noted on each of the parent's/guardian's quotes under every theme to provide context. However, this has not been done for child quotes as most parents/guardians whose children were indicated to be overweight/obese chose not to show the letter to the children. Consequently a number of overweight/obese children thought that they were of ideal weight. It would therefore be misleading to provide an attribution for a quotation made by an overweight child who thought he/she was of ideal weight.

Table 6.2 Parent/guardian interview participants and their contribution towards the major themes

Major Theme	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16
Feeding back child weight status results	✓	✓	✓				✓		✓	✓	✓	✓	✓	✓	✓	✓
Challenges of parenting in contemporary society	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓				
The 'obesogenic environment'; a challenge for childhood obesity control	✓	✓	✓		✓	✓	✓	✓		✓			✓	✓		✓
Accessing help within the health system subsequent to weight feedback from the measurement process	✓	✓	✓			✓		✓	✓	✓			✓	✓		
Enhancing awareness of weight problems for behavioural change	✓	✓	✓			✓	✓	✓	✓		✓				✓	
Impact of the measurement process on mental wellbeing	✓		✓	✓	✓			✓	✓					✓		
Challenges of the measurement programme	✓	✓	✓			✓		✓	✓				✓			✓

Table 6.3 Child interview participants and their contribution towards the major themes

Major Theme	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21
Feeding back child weight status results	✓	✓	✓		✓		✓					✓		✓		✓			✓		
Challenges of parenting in contemporary society																					
The 'obesogenic environment'; a challenge for childhood obesity control	✓		✓		✓				✓				✓		✓			✓			
Accessing help within the health system subsequent to weight feedback from the measurement process	✓				✓			✓	✓	✓		✓		✓			✓				
Enhancing awareness of weight problems for behavioural change		✓	✓		✓	✓			✓								✓				
Impact of the measurement process on mental wellbeing	✓		✓	✓	✓			✓	✓	✓	✓	✓	✓		✓			✓	✓	✓	
Challenges of the measurement programme	✓	✓	✓						✓			✓	✓				✓				

6.4 Feeding back child weight status results.

> .....I was really shocked at the content of the letter. That was just the initial shock of my daughter who I had no concerns about at all. The last thing in the world I thought anybody would say is that she was overweight and then I get this letter with big bold writing on it and I really was sort of taken aback by it, and yet - had it been worded differently - I might have thought, 'Oh well, fair enough, we need to continue teaching her the right way'. But, as it was, at the time I was a bit like more shocked than anything (parent 01-child obese/overweight).

Interviews conducted with parents/guardians in the current study revealed some real issues regarding the reaction of parents/guardians towards the weight feedback they received from Gateshead PCT. The news of the actual weight status of children that arrived in the letter from the PCT brought varying reactions from parents/guardians, depending on the category of weight status the child was put in. The reaction of parents/guardians seemed to follow a sequence of events. Exploring and understanding this pattern of behaviour could be a major step in determining the best way to deliver interventions targeting child weight problems in the affected families, while strengthening healthy behaviours in the unaffected ones. The next sections will explore the response of parents/guardians in detail.

6.4.1 Process of reaction for parents/guardians of ideal weight children

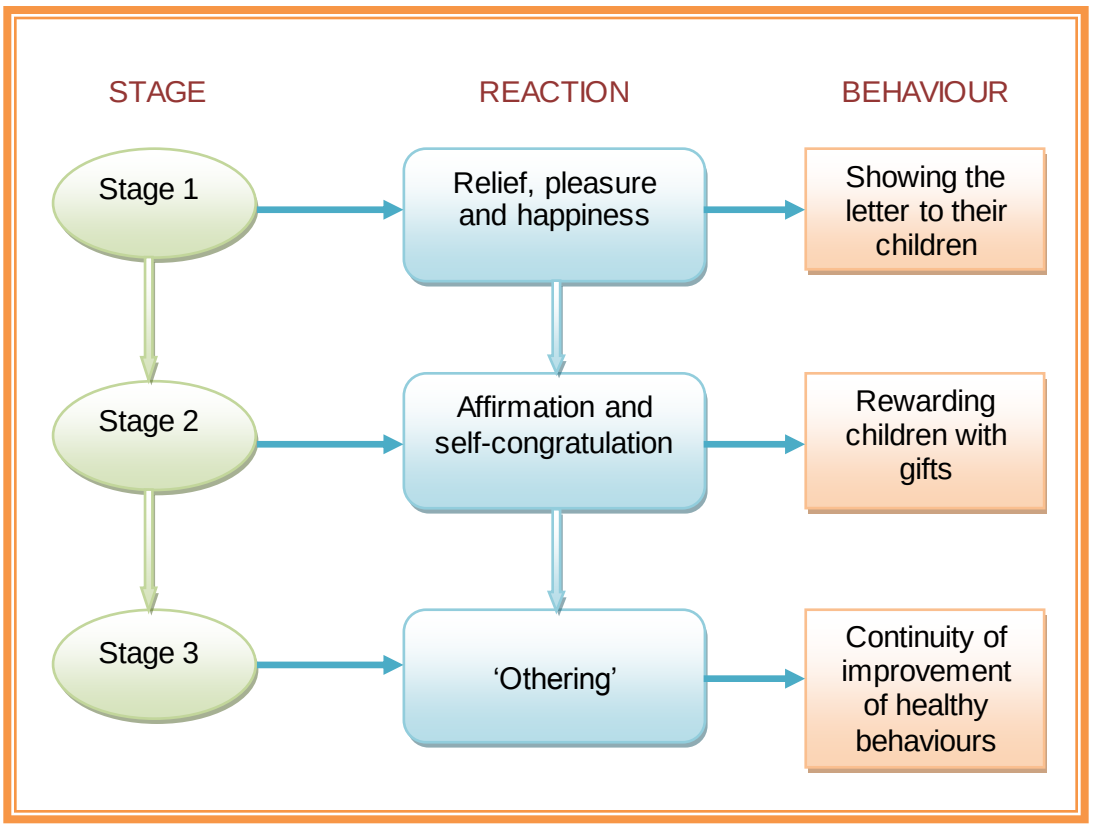
The accounts of parents/guardians whose children were indicated to have the ideal weight status followed a sequence of events summarised in Figure 6.1 below. This process is characterised by three main stages, each demonstrating distinct reactions and behaviours. In the first stage parents/guardians reported feelings of relief, pleasure and happiness soon after receiving the weight feedback letter indicating that their children had the correct weight status. For instance, a parent remarked:

> ……I was quite happy that he was in the normal brackets (parent 14 – child of ideal weight).

However, it came out quite clearly that, parents/guardians had not been sure whether or not their children were the correct weight, before receiving the weight feedback from the PCT. These parents/guardians often perceived their child's weight status as being underweight.

….. I always thought, 'Oh! May be she is underweight', you know, but she wasn't. So when I first read it I went, 'Oh! This is fantastic.'….. (parent 12 – child of ideal weight).

Figure 6.1 Sequence of events following receipt of feedback for ideal weight children



A small number of parents/guardians perceived their children to have the correct weight, so, the weight feedback was a standard against which they confirmed what they all along suspected. For instance a parent said:

….. It just confirmed what I always suspected anyway, so it was okay…. (parent 03 – child of ideal weight)

Parents/guardians then entered into the second stage which is characterised by affirmation and self-congratulation. Feelings of having been able to do their duty as good parents are evident. It perhaps comes as no surprise that some of the children reported that they were rewarded with parties and gifts as described in later sections. Soon parents/guardians subsequently enter into a third stage which is characterised by 'othering'[6]. In this stage, parents/guardians see themselves as

[6] Othering is a process that identifies those that are thought to be different from oneself or the mainstream (Johnson *et al.*, 2004)

part of the group that is doing the right thing, and other people, especially those whose children are indicated to have weight problems, are not doing things correctly. Parents/guardians held the view that, those parents/guardians whose children are obese/overweight need to do something about it rather than just blaming the health authorities for informing them about the weight status of their children. For instance a parent said:

> …….I mean it's not too late, they can do something about it. What's the point there of saying, 'I don't need the bloody government telling me my child is overweight. They can't even run the country'. People with obese children become really defensive instead of becoming aware of it. I would guess, and I am not being funny, these parents probably know their kids are overweight. If you know your kid has been portly and is being classed as being obese or whatever, you need to probably think and know, yeah, that can't be wrong…. (parent 03 - child of ideal weight).

Similarly, some parents/guardians felt that other parents with overweight and obese children make their children gain weight by buying them fatty foods. A parent said:

> ……they are the ones feeding the kids and if they (the children) are overweight they are not feeling good about themselves….. The letter just looks to enforce that, not only you are overweight, but the kid is overweight as well; and it's your fault….. How is that not your fault really? (parent 13 - child of ideal weight).

Affirmation of the child being the ideal weight for height leads to continuity of improvement of healthy behaviours among families. Most parents indicated that the feedback letter gave them reassurance to continue giving their children healthy foods and encouraging them to do more physical exercise. For example, a parent noted:

> ……It means I am feeding my children in the right way and I will continue doing just that…I will also encourage them to continue exercising….. (parent 07 - child of ideal weight).

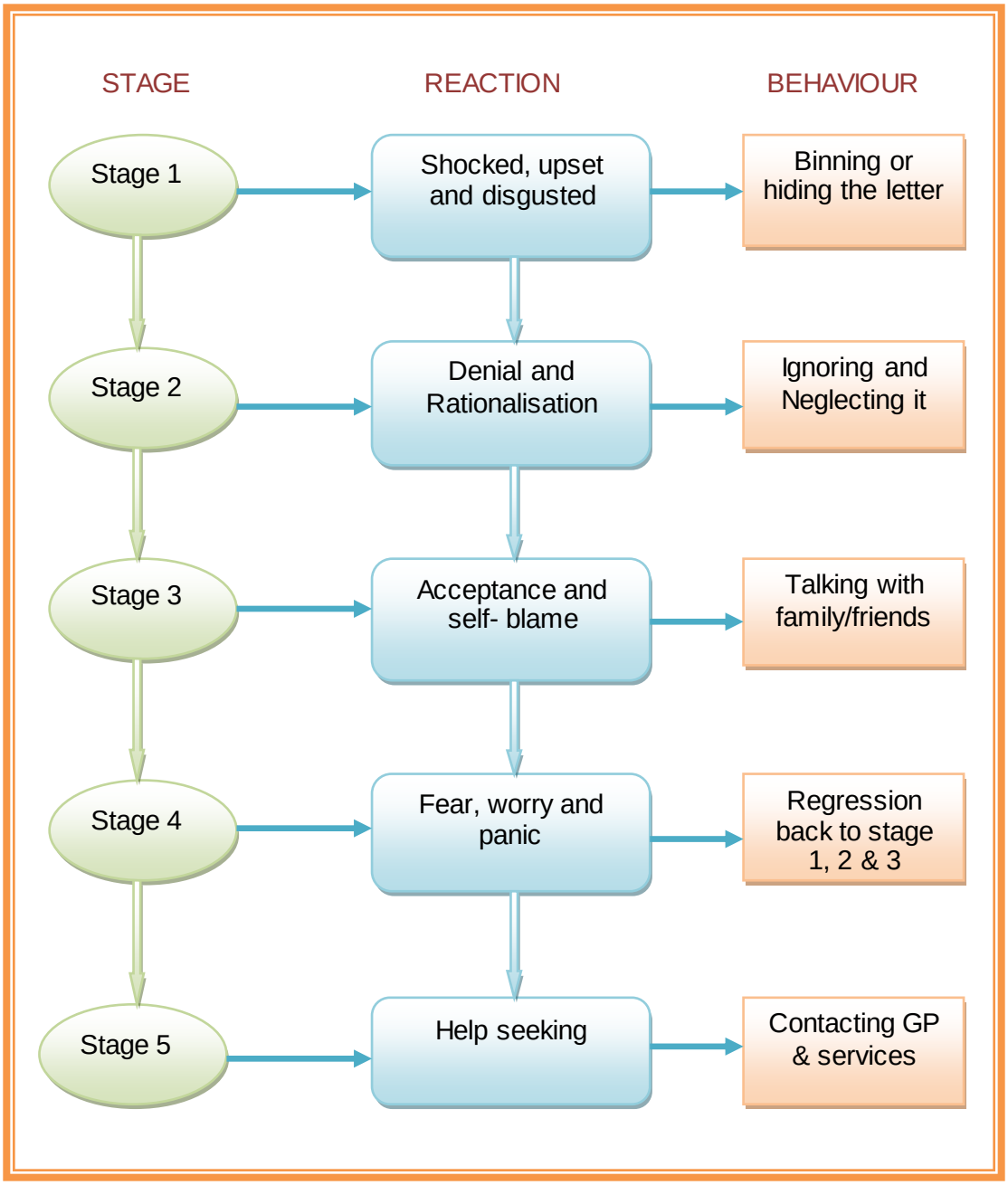
Of particular importance, however, is the reaction of parents/guardians whose children were classified as overweight/obese, to which we will now turn in the next sub-section.

6.4.2 Process of reaction for parents/guardians of children indicated to have weight problems

Generally parents/guardians whose children had been labelled overweight/obese were clearly upset about the news. These parents/guardians reported that it had never occurred to them that anyone would regard their children as

overweight/obese and felt that it added to the 'insult' to see words like 'overweight' and 'obese' in bold letters. It is quite evident that this feedback caused a lot of panic and worry among families, as they were caught unawares. In light of this, different parents/guardians reacted differently to the news. Some parents/guardians chose to throw away the letter, and never to let their children see it, as they feared that this could impact on their children's mental wellbeing. Others chose to sit their children down and tell them of the news, but in a tone that would not create panic. The sequence of events that occurred from the time of receipt of the feedback seems to represent a process characterised by a similar pattern of parental behaviour in different families. This process has been summarised in Figure 6.2.

Figure 6.2 Sequence of events following receipt of child feedback in overweight children



This process comprises of five stages, each characterised by a particular set of reactions and behaviour pattern that parents/guardians demonstrated from the time they received the weight feedback onwards. Soon after receiving the feedback describing children as being overweight or obese most parents/guardians reported being 'absolutely' - 'shocked', 'horrified' and 'disgusted.'

As a result these parents/guardians opted either to throw the letter away in the bin or to hide it away so that their children could not see it. A mother whose child had been labelled overweight/obese told of her initial reaction:

> ….my initial reaction was, I was really shocked at the content of the letter. I was horrified, absolutely horrified, because out of the whole family you see I am sort of quite plump. My youngest daughter is probably a little bit overweight, but DJ is the one I would say, under no circumstances she is overweight (parent 01 - child obese/overweight).

Another parent when asked about what she had done with the feedback letter, whether or not she had discussed it with her son she said:

> .....I was so shocked when I opened the letter and I read the contents because I always thought that my son was the right weight. Honestly, I have had no concerns at all about his weight or about what he eats or anything, so I didn't even tell him we got it. I hid it away, because I don't want to encourage him to be so conscious of his weight and I think he has the right attitude towards food and exercise (parent 10 - child obese/overweight).

While this mother just hid the feedback letter, some other parents/guardians decided either to destroy the letter completely or to throw it away in the bin. A mother whose son had been labelled overweight told of her disgust.

> .....all along I thought my son was absolutely fine and then it had on the letter that he was very overweight and the certain illnesses that he could get when he is older which I was quite horrified about and then I put it in the bin so he couldn't see it cos I didn't wanna worry him. Obviously he is old enough to read. You know what I mean? (parent 02 – child obese/overweight).

These reactions and behaviours are characteristic of stage one in the weight feedback reception process.

It was quite evident that, after the initial reactions most parents/guardians whose children had been labelled overweight/obese by the weight feedback sooner or later enter into denial of their child's weight status. This is stage two of the weight

feedback reception process. Spontaneously parents/guardians (especially mothers) find themselves rationalising about their child's weight status, eating habits and physical exercise. In the current study most of the parents/guardians spoke of their children leading a very active lifestyle, eating a balanced diet, doing a lot of outdoor activities and therefore not accepting that anyone for any reason could label their children overweight/obese. During this stage of the weight feedback reception process parents/guardians exhibited a wide range of behaviours. Some parents/guardians chose to ignore and neglect the feedback letter completely; others just wanted to sweep it under the carpet suggesting that it was not an issue for their children. For instance a mother said:

> .....I really thought at the time that she was at a very healthy sort of weight range. She is sort of within what I believe she should be. She does lead a very active lifestyle, she dances and she does sort of quite a lot of outdoor activities and things and like I said she does eat a very healthy balanced diet. I would like to sort of just brush it under the carpet (parent 11 – child obese/overweight).

But perhaps it is of particular importance to point out here that some parents/guardians could not just let it go by, so they took it upon themselves to write back to the authorities describing their disgust about the letter they had received. One of the parents/guardians wrote to the current study research team the letter below:

> To whom it may concern,
>
> I would like to express my disgust after receiving a letter from the Gateshead school nursing team stating that my daughter is **overweight**. At 11 years of age she is becoming increasingly aware of her image and is self-conscious about the way she looks. Thankfully she did not see the letter we received stating in **bold** lettering that she was supposedly overweight. Had she done so I think it would have been a real blow to her confidence, possibly with detrimental effects to her health as she may decide to change her very healthy attitude to eating and exercise? I think letters such as this can be as damaging as they can be helpful. I have no concerns about my daughter's weight and believe that she is sufficiently active to maintain a healthy weight.
> Yours sincerely,
>
> Parent 01 – child obese/overweight.

This parent, after speaking with the researcher in the interview, reported feeling much better that she had spoken to someone about it. This underscores the

importance of following up the weight feedback to try and provide the opportunity for parents/guardians to vent their anger. This mother said:

> …..I am glad that I have had the opportunity to speak to you about it, because at the time I did feel very strongly about it but maybe there were some other parents that felt as strongly but just didn't do anything about it afterwards and just sort of went, oh well (parent 01 – child obese/overweight).

It was clear from the interviews that parents/guardians did not know who was responsible for the weighing and feedback process and therefore who to contact subsequently. This has been discussed in detail in later sections. Some parents/guardians however recognised their reaction as being protective behaviour for their children and they noted that it was just instinctive for a parent/guardian to protect their children and therefore the perception of the measurement process and the weight feedback would largely depend on the weight status category into which a child has been placed. They reckoned that parents/guardians whose children are labelled as ideal weight would perceive and react differently to the weight feedback. A parent commented:

> ..... parents are just protective aren't they? It's a mother's instinct to protect your children. Obviously you are not making up the child's weight. You are not sort of adding a few pounds just to try and annoy the mother are you? It all starts with them putting things in their hands, in their mouth isn't it? Instead of trying to say my God I have to do something about it they are not they are saying this is wrong, the scales are wrong, aren't they? They accepted to take part willingly and they've been given the information and now they don't like the conclusion. If the child's BMI is sort of off the scale, it's off the scale. Instead of arguing about it try and keep laid to do something about it (parent 12 - child of ideal weight).

Another parent said:

> .....you're never gonna say that it's wrong if your child is like sort of what they should be, so most parents who have concerns about the letter they are only saying it's wrong because their children are overweight. And the non-overweight are saying it's good. It's just instinct to protect your children. Some of them (parents) just give them (children) anything they want just to shut them up (parent 15 - child of ideal weight).

It is important to note the stigma associated with weight status, which has been fuelled by media exaggeration, insensitive commentators and so on. Consequently those who are overweight and obese have been portrayed as being stupid, lazy, unable to control themselves and many other derogatory things. Such stigma simply increases the pressure on those who are overweight/obese (Schwartz and

Puhl, 2003). Little wonder then that parents were keen to reject the stigmatic label for their children. For instance in the current study a lot of parents/guardians who received weight feedback indicating that their children are overweight/obese denied the fact that their children were genuinely overweight/obese. However it may be that they are not rejecting the weight status category *per se* but rather the attached negative attributes of this category. This finding highlights the immediate impact of attaching negative attributes to overweight/obese weight categories. Among other things this is likely to make it increasingly difficult to work with people who have weight problems in order to help them. It is quite likely that the more weight status is associated with derogatory attributes, the more those with a problem will distance themselves from services that would instead help them.

But sooner or later most parents/guardians who had denied their child's weight status started to come to terms with it, recognising that denial would not solve anything. They reported referring back in time and realising that probably they hadn't been feeding their children healthily and in a way blaming themselves. At this point they were entering into the acceptance stage, which is the third stage of the weight feedback reception process. Many parents/guardians in this stage reported relying on friends and family, so they discussed the feedback with either their parents, friends or neighbours to try and examine what might have gone wrong. In this stage parents/guardians fully recognise that actually their children could be overweight. A parent of an overweight child said:

> .....I think I studied it for a while and I just thought about it for a while and I was just a bit sort of shocked and I kept thinking, 'well, is she?' I sort of discussed it with my mother and things like that and sort of discussed it with a few people and the more I thought about it I thought: Well yes, I agreed for her to be in this study and I do have to agree with the letter. Maybe she is actually overweight (parent 01 – child obese/overweight).

At stage 4 of the weight feedback reception process most parents/guardians became worried and started to panic. In the current study, some parents/guardians reported feelings of disappointment and anger similar to the reactions in stage 1. But also it is at this point that parents/guardians would like some answers about what they could be doing wrong and this leads to the final stage, which is help seeking. A lot of parents/guardians at this stage get on the phone to try and find out what could be done differently in order to fix the weight problems of their children. For instance some parents/guardians reported:

> .....I didn't think he was 9 stone 7 but he was. In fact I was worried, but I knew it wasn't the end for me. It was obviously then some of the other mothers were talking about things like that, and I know a few other mothers were concerned and then also got on the phone. I mean his BMI and everything about it was just off the scales, which I was shocked about. And yet with me I thought he was way underweight. I mean that was quite a worry for us..... (parent 02 – child obese/overweight).

Another parent spoke of her friend's response:

> ……BT's mum after some time got on the phone about it, because she says she thought she was doing things well. BT was eating really healthily and plays football, a lot of sport. She said she's phoned to know what she could change to try and put that BMI down really (parent 12 - child of ideal weight).

This highlights the importance of getting the time right for introducing interventions to parents, as the next subsection identifies.

6.4.3 Right timing for interventions following weight feedback reception

Although 'readiness to change' has been fully discussed elsewhere in Section 6.9, it is worth noting here that a successful health intervention needs to target participants at the point when they are ready to change their behaviours. Many researchers and commentators have echoed the need to follow up weight feedback with appropriate interventions. However debates have gone on regarding the nature of the interventions needed, the timing of the interventions and the target population for the interventions. Some researchers have argued for the need to make follow on calls to families whose children are indicated to have weight problems immediately after sending feedback to parents/guardians to give them some suggestions about the services they could approach. However there has never been any efforts to try and identify the process families go through when they receive weight feedback in order to identify the best time to introduce interventions. For the first time the current study has been able to make a step in identifying what behaviours and reactions families undergo when they receive weight feedback. The findings from the current study do not support the argument that information and interventions are best offered at the point of sending feedback to parents/guardians. In fact when introduced at this time information/interventions are likely not to work effectively.

The weight feedback reception process demonstrated that interventions could best be targeted at the fifth stage when the news of the weight feedback has sunk in properly and the parents/guardians have had time to go through denial and have finally accepted the weight status of their children and are ready to identify what they

are doing wrong so that it can be changed. The best example of this comes from the experiences of the researcher in the current study, as narrated next. A mother was approached for consent to take part in the one-to-one semi-structured interviews well before she received the weight feedback. This parent accepted and was very happy to speak with the researcher about her son's weight issues. Later information was received from the Gateshead PCT that weight feedback had been sent to all parents/guardians in her locality. Immediately the researcher made a telephone contact to set up an appointment to go and speak with the mother. However the mother instead just expressed her disappointment over the feedback she had received labelling her son as overweight, over the phone. It was clear that she was angered and she withdrew her consent to be interviewed, citing reasons that she did not want to speak to anyone about her son's weight issues because she believed her son was the right weight and had been leading a very healthy lifestyle. The researcher tried to convince her that he was from Teesside University, conducting a project that was just following up the feedback process and simply wanted her views about the feedback, but all in vain. She instead thought that the researcher had sent the feedback to her and she didn't want to speak to him. Fortunately she allowed the researcher to record what she was saying on the phone. At one point she said:

> …..I am not interested in speaking to anyone about my son's weight. At the moment I believe my son is normal and has no weight problem at all. Although you sent in a letter saying that my son is overweight, I do not believe it and for that reason I will not give you an appointment to speak to you (parent 16 – child obese/overweight).

However when asked whether she would consider seeing the family GP or any other services about her son's weight she answered:

> Oh no, definitely not. The only time I would be seeing a GP is when I think he is poorly. I don't refuse anything really you know but I don't think it's the best really (parent 16 – child obese/overweight).

This points to the fact that parents/guardians didn't have a clue about the whole process of measurement, they didn't know who was doing it and why, and they did not know who to contact etc. However this has been discussed fully elsewhere in Section (6.6). In this particular example, the parent was contacted again after some months to see if she would be happy to speak to the researcher about her son's weight issues and she accepted. By then she had gone through all the stages of the weight feedback reception process and she was at the help seeking stage and ready to change whatever was not going rightly. Undoubtedly it is very important to

identify the right timing for the interventions, as it would save wastage of resources. It has been the practice of many PCTs routinely feeding back weight status of children to include extra materials identifying for the parent what he/she could do next. The effectiveness of this is also under serious question as many parents/guardians reported never having read any of these materials after receiving the initial shock of their children being labelled overweight/obese. A parent said:

> …. if it had any supporting information in it, it didn't even sort of hit me at all because my initial reaction was…. I was completely horrified at this letter, the words in this letter and I literally didn't want DJ to look at it because I didn't want her to see this and sort of be traumatised by it. So I literally put it back in the envelope and put it away because I was like….. goodness me I don't want her thinking it that she is sort of fat or so. I didn't even tell her we got it (parent 01 – child obese/overweight).

It is clear that the aim of these materials to raise awareness among families was completely defeated because of the inappropriate timing of the intervention. Moreover most parents/guardians, as already mentioned, did not choose to show anything to their children for fear of worrying them. Instead they found other ways to convince their children by telling them different heights and weights that depicted they were of ideal weight. For instance DJ who is the daughter of parent 01 when asked what her letter said she reported:

> .....my mum told me that I was like the right weight thing and the actual height and weight I put on the other form (data collection form for Teesside University project) but she did not allow me to see what was in the letter (child 01 – child obese/overweight).

It was identified that the reactions and behaviours of parents/guardians described could be influenced by a number of factors which are discussed in the next section.

6.4.4 Behaviour influencing factors in the weight reception process

Having explored the process of receiving weight feedback it is important to identify some of the factors that could have led to the reactions and behaviours described in the process. The first and most important is the content and preparation of the letter. This was the main reason behind the first level reactions of anger. Most parents/guardians reported being upset by the way the letter was prepared and the content it was carrying. A parent reported:

> ……the big C word that was on the letter I didn't agree with–the cancer word. I didn't agree with that because he was just horrified that I ended up taking it off him and I wouldn't show it to him again because he was so sensitive and reading something like that he just panicked. So I thought that it was completely wrong, I was like, oh my God the scales are sensitive to

> try and outline the people who did have problems or could have problems but that still sort of give us the conclusion of what could happen? I know it is picking at it pathetically, but to an 11 year old I mean that was like it wasn't best written at all. It did create a lot of panic to all of us.....I was kind of like, oh no! It's just a load of rubbish; the data is wrong kind of thing. But to an 11 year old saying that is weird, isn't it? (parent 02 – child obese/overweight).

While parents/guardians acknowledged the fact that no one was trying to make up the weight results of their children just to try and annoy the parents/guardians, they voiced concerns about the sensitivity of the weight issue in society and therefore the need to communicate about it with a high degree of prudence in order not to cause worry, panic and annoyance but rather to get parents/guardians and children on board towards fixing the weight issues. They identified the need to focus attention on healthy lifestyles rather than numbers. One parent noted:

> …….it is how the feedback is presented to parents. My daughter was right on the line, so to me she could have been average, she was as much average as she was overweight. She was right on the line and it is just how it is put across to the parents. If I had been different from the way I am, I could have made a big issue about it and made a big song and dance, made her believe that she was overweight and stop her eating next to nothing and I don't think that is right. I think it was a bit shocking to read it in black and white, big bold letters - your child is overweight - and I was like well! If it is put across better - don't ask me how because I don't know how you would do it - parents might not panic as much. It would just be like alright, well maybe I should start looking at adopting a healthy lifestyle. I think it is good to inform parents. It's just <u>how</u> you inform them (parent 01 – child obese/overweight).

The important question arising out of this is: how should the letter therefore be written? There seems to be no obvious answers and the parents/guardians in the current study did not give an awful lot of suggestions, but on the bottom line there was consensus that care needs to be taken to ensure that the letter is not put across harshly, indicating blame for those identified to have weight problems. Rather it should adopt a neutral language aimed at getting parents/guardians to realise that something needs to be done about their children's lifestyles. Therefore use of derogatory terms aimed at badging them as bad parents/guardians and putting the words like overweight/obese in bold lettering could instead create panic, worry, and paranoia among parents/guardians, none of which can help to fix any problems. On this a parent suggested:

> .....I do think re-wording the feedback form in a different way so that it doesn't come across so harshly if the child is above or below the average, because as a parent you want your children to be sort of the best that they can be. You want them to achieve, but you don't want them to stand out in

> a bad way and that is one of the things that sort of is a cause for concern. So I think if it is worded differently so it doesn't cause the sort of initial panic (parent 09 – child obese/overweight).

Wadden and Didie (2003) emphasized that use of derogatory terms to describe weight status can instigate annoyance among all people and can potentially deter the attention which would be placed on the important aspect of helping those with weight problems. They suggested that advocates for the approach of 'telling it as it is' and confronting people with their problems forget the demeaning moral implications that such derogatory words can carry and the likely consequences of drawing those with the problems further away from the help they would have got. In many ways the accounts of parents/guardians in the current study appear to support these arguments.

6.4.5 Overall parental perception of child weight feedback

Of particular interest is the fact that all parents/guardians agreed that this feedback, if communicated sensitively, could have a positive impact on a lot of families, and could act as an important spur to families to think of adopting healthy lifestyles. But this would need more commitment from both health and local authorities to work with families, almost on a one-to-one basis. Most parents/guardians reiterated the fact that it was important to routinely feedback the height and weight measurement of their children, citing reasons that it is their responsibility to ensure that their children become as healthy as possible. As such, they should know if things are not going right somewhere. A parent talked of the measurement and feedback process:

> .....absolutely a good idea because it is not down to anybody else. If my daughter has got a cough I get her medicine, if she has cut her finger I put a plaster on it. It follows that if she is overweight I am entitled to know so that I can change the way of life, change the diet, increase physical exercise and so on. I mean you can't go on blaming it on others all the time (parent 07 - child of ideal weight).

This sort of attitude was more evident among parents/guardians whose children had not been labelled as having weight problems. But it is also true that most parents/guardians whose children had been identified as having weight problems also adopted this attitude after some time had passed. The interesting question to ask here is 'how long does it take for parents/guardians whose children have weight issues to come to terms and accept it'. At the moment there is no empirical evidence to back any answer to this question. More research would be needed to answer this question. However what the current study has apparently uncovered is that there is a process through which parents/guardians whose children are labelled as having

weight issues pass, from the moment they learn of the news of their child's weight status to the point when they come to terms with it and accept it. In between, there are important stages such as denial, panic, worry and fear which should not be underestimated, as they can significantly impact on the effectiveness of any interventions.

Earlier studies provided evidence for the link between parental concern and child weight status (Schwartz and Puhl, 2003). This has been again shown by the current study. It is therefore appropriate to believe that parents/guardians do get concerned when they learn about their child's weight status. However this is more likely among parents/guardians whose children are indicated to have weight problems. Whether this should be used as the basis to encourage routine feedback of weight status to families is a contentious point, since the available literature indicates that many studies conducted have produced equivocal findings regarding the perceptions of parents/guardians about the weight status of their children. Some studies indicate that parents/guardians of younger overweight children cannot perceive their children as being overweight (Baughcum *et al.,* 2000; Etelson *et al.,* 2003; Vanhala *et al.,* 2011).

The findings from the current study corroborate the findings from these earlier studies. It was quite evident that parents/guardians had lost their ability to judge the right weight status for their children. A lot of parents/guardians relied on comparison of their children with their peers. In light of the current changing trends of the average weight status among children towards overweight, it is quite unlikely that parents/guardians using this method would get right the actual weight status of their children. This could provide some support for the need to feed back the right weight status of children to families in order that those indicated to have a problem can start to work on it.

However, in their study about mother's perceptions of adolescents' weight status, Boutelle *et al* (2004) found that most mothers could accurately estimate their child's weight status. This is in contrast to the findings in the current study. However the age of the children in the two studies is different. Boutelle *et al* (2004) studied parents/guardians of adolescents while the current study interviewed parents/guardians of 10 -11 year old children. This age difference could explain the difference in the findings of the two studies, given the fact that when children are a

lot younger they are more under the control of their parents/guardians, whereas in adolescence they are more independent.

Regarding sending weight feedback to parents/guardians, an experimental study by Grimmett *et al* (2008) found that most parents/guardians accepted weight feedback and there were fewer adverse effects for parents/guardians and children even when the child was obese; but some participants got distressed when they received the weight feedback. Contrary to the findings from this study, the current study found that most parents/guardians whose children had been identified as having weight problems found it difficult to accept the weight feedback just after receiving the feedback but later they accepted it. This is similar to the findings of Mooney *et al* (2010) in their study about the early experiences of routine feedback to parents and children. What the Grimmett *et al* (2008) study does not identify is the point at which they studied the parents/guardians from the time they had received the feedback; given the fact that this was also an experimental study, there could be several biases affecting the conclusions from the study. The current study, given that it was conducted in a natural setting relating to the NCMP providing feedback to parents, has provided evidence that soon after receiving weight feedback most parents/guardians whose children have weight problems do not accept the feedback easily. However, later on, after going through the denial stage, self-blame, worry and panic, they accept the feedback. Parents/guardians of children indicated to be of ideal weight, receive the feedback happily and this reinforces the continuity of positive healthy behaviours in their families. Any interventions for children with weight problems should therefore be targeted at the stage when parents/guardians indicate readiness to change.

However, the effectiveness of interventions is likely to depend on how well the interventions prepare the parents/guardians to negotiate the challenges of parenting in contemporary society as discussed in the next section. But first Box 6.1 presents the summary of the key findings under this theme.

Box 6.1 Summary of key findings under the theme – feeding back child weight status results.

- Most parents/guardians did not consider their child's weight status an issue until they received a letter showing the weight status of their children from the PCT.

- Parents/guardians react differently to the news of the weight status of their children. The reaction largely depends on the category of weight status in which the child is placed.

- The reactions of parents/guardians whose children are indicated to have an ideal weight follows a sequence of behaviours involving three stages:

    - **Stage 1** – characterised by relief, pleasure and happiness, parents/guardians choose to show the letter to their children.
    - **Stage 2** – characterised by affirmation and self-congratulation, some parents/guardians choose to reward their children with gifts.
    - **Stage 3** – characterised by othering; parents/guardians choose to reinforce and improve the healthy behaviours.

- The reaction of parents/guardians whose children are indicated to have weight problems follows a sequence of behaviours which has been termed here the weight feedback reception process. This process involves five stages:
    - **Stage 1** – characterised by shock, disgust, upset and anger. Parents/guardians usually choose to throw the feedback letter in the bin or hide it away.
    - **Stage 2** – characterised by denial, rationalisation and rejection. Parents/guardians usually choose to ignore and neglect the feedback letter.
    - **Stage 3** – characterised by self-blame and later on acceptance of the feedback. Parents/guardians usually begin to talk to family and friends about it.
    - **Stage 4** – characterised by worry, panic, and fear. Parents/guardians usually regress back to anger, denial, and acceptance.
    - **Stage 5** – characterised by help seeking. Parents/guardians usually get on the phone to try and find some help and support.
- Some factors thought to be behind some of the behaviours of parents/guardians, especially denial and rejection of the overweight/obese weight category, included:
    - Stigmatisation of weight issues by the media, as in attaching derogatory attributes to overweight/obese weight categories such as laziness, stupidity, lack of self control etc.
    - Content and preparation of the feedback letter. For instance bold lettering of the words 'overweight/obese' and including terms like 'cancer' in the letter.
- Parents/guardians emphasised the need to communicate about weight issues in a more tactful way in order not to cause worry, panic and annoyance but rather to get parents and young people on board. Thus emphasis should be put on:
    - Healthy lifestyles rather than numbers.
    - Support rather than blame
- All parents agreed that weight feedback, if communicated sensitively, could have a positive impact on a lot of families and it could act as an important spur to families to think of adopting healthy lifestyles.

6.5 Challenges of parenting in contemporary society

> …. I know he is really tall anyway but I don't know if I am doing something wrong - why he is 9 stone 7 - because all along I thought he was absolutely fine and then it had on his feedback letter that he was very overweight and the certain illnesses that he could get when he is older, which I was quite horrified about. And then I put it in the bin so he couldn't see it cos I didn't wanna worry him. Obviously he is old enough to read. You know what I mean? (parent 02 – child obese/overweight).

The thematic content analysis of the interviews conducted in the current study identified another major theme – challenges of parenting in contemporary society. Several factors ranging from parents/guardians' judgement of their child weight status, to the different strategies parents/guardians have to adopt for parenting in contemporary society are discussed.

6.5.1 Uncertainty about the correct child weight status

Within the current study a number of parents/guardians seemed to have lost the ability to judge whether or not their children were overweight/obese or had weight problems. Parents/guardians whose weight feedback indicated that their children were correct weight had earlier misperceived them to be underweight. Receiving this feedback was therefore reassuring to them that their children were of correct weight. Most parents/guardians reported that they found it difficult to tell whether or not their children were becoming overweight/obese. They cited reasons such as the gradual development of their children, which makes it quite difficult to notice changes. While this was a possible reason, it was also quite clear that most parents/guardians compared children with their peers in schools to judge whether or not their children were the right weight. On this a parent said:

> …..I look at, the likes of DJ and then I look at a lot of her peers.....she is a very slight girl; she is probably one of the smallest in her class; very petite compared to her classmates. I do think that if her letter said she is overweight, goodness knows what a lot of the other children had in their letters. So it was like across the board there would probably be an awful lot of concern cos I think she is probably one of the smallest and the more sort of healthier children in her class (parent 01 – child obese/overweight).

Due to the shift in the average weight status of children in the UK towards overweight, a lot of parents/guardians have lost the sense of what the correct weight is like (Crawford *et al.,* 2006). Therefore parents/guardians of overweight children tend sometimes to see them as correct weight, just because they are smaller than their peers in the same age range in the school. It was evident that parents/guardians rely on comparison of their children with their peers to judge their

weight status. One would think that parents/guardians would be able to note deviations from the norm in terms of their children's weight status when they have to buy clothes for them that are a bit larger than their age range. However many clothing outlets in the UK and other developed countries have altered the dimensions associated with specific sizes to suit the changing trends in both adult and child weight status and shape. Consequently what used to be a woman's size 14 a few decades ago is now labelled as size 12.

Moreover debates still exist in societies about what the ideal size or ideal weight status should be. Kumanyika and Stettler (2001) discussed the shift in perceptions about the right size and weight in societies where obesity has become more prevalent. Additionally Crawford *et al* (2006) noted that children who grow up in families where the parents/guardians, siblings and neighbouring friends are obese or overweight are likely to perceive being overweight as the right size. Again the findings from the current study corroborate these arguments. However it seems quite clear that with the changing trends in the average weight status of children towards overweight, parents/guardians are likely to continue misclassifying their overweight children as being ideal weight.

As discussed in later sections, factors associated with the obesogenic environment have a lot to do with the increasing trend in childhood obesity, especially in the UK and other developed countries. Yet within this obesogenic environment many parents/guardians strongly believe that the child's weight status is mainly the responsibility of a parent and nobody else, as some parents/guardians noted below:

> ….yes I think everything is down to the parents really. I wouldn't put anything on anybody else… (parent 07 - child of ideal weight).

> ….it's not really even the kids' fault that they are overweight; it's entirely the parents' fault… (parent 02 – child obese/overweight).

> ….ultimately if the kid is overweight it's not the kid's fault; it's the parents' fault, because the kids don't go into the supermarkets and buy their stuff and likewise kids do not cook their own food; it's the parents who always do. You know the kids can only eat what is in the house…. (parent 12 - child of ideal weight).

But whether or not the child's weight status is truly the parents'/guardians' fault is a matter that will remain under debate given the challenging factors contributing to the obesogenic environment (discussed in later sections) over which parents/guardians have little control. For parents/guardians to feel that their child's weight status is

their own responsibility could be due to the societal norms that have constructed it that way. So intrinsically parents/guardians of overweight children feel guilty for their children's weight status, yet actually they do not know what has gone wrong. The current study provides evidence for this as it identified that most parents/guardians whose children were overweight thought they were doing everything right and were shocked by the news of their children being overweight. It was quite clear that such parents/guardians demanded answers about what was going wrong, as one parent asked:

> ….I all along thought I was doing the right thing for my children, but my son's letter showed he was overweight so, come on, raise some answers for me about what I am doing wrong. I don't know. (parent 09 – child obese/overweight).

Although other studies have found similar findings (Dixey, 1999; Mooney *et al.,* 2010), Jones *et al* (2011), analysing data from the Gateshead millennium study, found that most parents did not see child weight status as their responsibility.

Uncertainty of the determinants of a child's weight status among parents/guardians could also exacerbate the challenge of parenting in the contemporary society. The narratives of parents/guardians in the current study indicate that parents/guardians held the view that weight status in children could be determined by more than just mere lifestyles. This can best be demonstrated by the scenario of one family where there were two daughters who had very much the same lifestyles and consumed similar foods, but one of them was overweight, whereas the other was of ideal weight. Therefore the critical question to address here is, if lifestyles are the main explanation for weight status among children then why the deviation in this scenario?

> …..I've got two daughters who eat very much similar things I feed them both the same. I've got one who is slightly overweight and she is as active if not more active than the other one, who I would say is of a very healthy weight (parent 06 - child of ideal weight).

Although many parents/guardians pointed to the fact that children's weight status could be influenced by other factors such as genetic predisposition, they still agreed that energy intake and physical activity had a strong bearing on the weight status of children, hence the need for support to enhance physical activity among children while reducing energy intake.

> …..I know some kids are genetically predisposed to being larger than the others but, at the end of the day, it's how many calories you are putting in

> and how many you are putting out that matters (parent 03 - child of ideal weight).

6.5.2 Responsibility for maintaining a healthy weight in children

The different accounts that parents/guardians gave in their interviews indicated that parents/guardians were well aware of their responsibility in ensuring that their children are healthy. However critical analysis of these accounts identified that within this responsibility there are two factors that influenced parents/guardians' mode of parenting. These factors include: the policing role of parents/guardians over their children and the role that parents/guardians have in teaching children to police themselves. It was quite clear that these two factors presented a dilemma for parents/guardians regarding which way to go. In their accounts many parents/guardians reported setting boundaries for their children, exercising direct control over their children's freedoms, and hence taking up the policing role. Much of the control was imposed on children regarding what they can eat and what they can't eat, where they can go to play and where they can't, the time they can spend with friends and so on. Regarding control over things to eat, a parent reported:

> …..I do exercise control over what my children can eat and I don't allow them to just go and take things out of the cupboards. If they want biscuits or crisps or anything like ice lollies they don't go and take things as they want. They always ask, and, if I feel they've had treats on that and really they shouldn't be having any more, I say 'no', and generally they have to accept that and they are quite happy with that.... (parent 07 - child of ideal weight).

Many parents/guardians reported exerting some form of control over what their children can eat and they did this using many different methods, including putting what they see as unhealthy foodstuffs in positions where they feel their children cannot access them easily (for example on top of fridges, in securely locked rooms and so on). To this one parent said:

> …..we've got that fridge in the garage and what we do, we just put the sweets on the top of the fridge, because they can't reach. Also some foods we think are for treats only are put in that fridge in the garage. Then we put much of what they can help themselves with into the fridge in the kitchen. So we only open that fridge in the garage when we think they should have a treat (parent 02 – child obese/overweight).

But given the busy lifestyles of parents/guardians in contemporary society this sort of policing of what children can eat and what they can't eat is highly questionable. In light of this, many other parents/guardians have chosen the alternative route of teaching their children to police themselves over what they can eat, where they can go, and what they can do. On this a parent said:

> …..my daughter knows by herself what she can eat and what she can't but she still tries occasionally to test boundaries I suppose, which is normal. You know, crisps is a big one! So she actually knows and that is the sort of thing that we try to push every now and again that she can exercise self-control (parent 03 - child of ideal weight).

Arguably teaching children to police themselves over what they can eat is not an easy task because children are always going to try and test boundaries, especially when it comes to things like sweets. Nevertheless parents/guardians rightly identified that it largely depends on the age of the child. Most parents/guardians agreed that most of their children were at a critical age (10-11 years) where they were beginning to become aware of their bodies and reaching puberty. A lot of parents/guardians saw this as an opportune time to get information about health across to children in an attempt to teach them to be able to police themselves. A parent noted:

> .....my son is a lot more aware because he has had that information himself so that has made him more aware. You know he is now at an impressionable age anyway; he is more aware of his presentation and he is starting to take things like deodorant; he is now showering every morning. He is starting to take pride in himself so getting that letter (NCMP feedback) at that age is probably just being perfect timing.....(parent 08 – child obese/overweight).

Although teaching children how to police themselves over what they can eat is obviously desirable, in practice this ideal situation is far from being realised. Parents/guardians will always exercise some form of control over their children, especially regarding what the children eat. This is in part due to the socio-construction that parents/guardians are entirely responsible for their children's health. This has engendered a conviction among the parents/guardians that their child's weight status is entirely their responsibility and so those parents/guardians whose children have got weight problems take it upon themselves to restrain their children's eating habits in pursuit of fixing their children's weight status. One parent whose child was overweight said:

> ……obviously I am not gonna let him eat himself stupid until he is too huge. I am going to keep watch of what I buy, because it's me who buys things and puts in the fridge, so it's mainly my fault isn't it? … (parent 09 – child obese/overweight).

But to think that it is only the responsibility of parents/guardians to fix their children's weight problems is manifestly absurd.

The literature indicates changing trends in modes of parenting among societies in the developed world. Hillman *et al* (1990) demonstrated a remarkable change in parenting in the UK between the early '70s and the early '90s, as discussed in Chapter two. Towards the late '90s researchers were able to show that more parents/guardians exercised control over their children playing outdoors, in fact more parents/guardians encouraged their children to play indoors (Valentine and McKendrick, 1997). Dixey (1999) reported that this trend of parental responsibility was the product of the increased perception of how dangerous the environment around children was within society. However, as discussed in Section 6.6.4, the issue of child safety could be seen as more of a 'moral panic' than a real one (Burns and Crawford, 1999; Critcher, 2001). Yet changes in the trends of parenting due to this panic have increased the burden on parents/guardians, making them more stressed, worried and paranoid about their children's safety. Parent/guardian interviews in the current study quite clearly indicated that good parenting seems to be viewed as being essentially about being able to control children more, as one parent noted:

> ….It's all down to parents. A good parent must be able to control what their children eat, where their children go and things. As parents we have the responsibility of looking after our children and ensuring that they are healthy. Do you know what I mean? (parent 11 – child obese/overweight).

This observation is, in many ways, similar to that made by Dixey (1999) in the Leeds study. She noted that escorting children especially to school had become a social custom which mothers felt obliged to obey in order to conform, and those who contravened this important custom ended up in a problematic situation. In light of these findings, it can be argued that parental controlling behaviour over their children is pervasive in the lives of parents/guardians and has become socially accepted as the right way of parenting in contemporary society. If bringing up children properly is viewed in society as the responsibility of parents/guardians, by extrapolation therefore it can be assumed that parents/guardians hold the biggest responsibility in ensuring that their children maintain a healthy weight. However while it is widely accepted that parents/guardians shoulder the biggest responsibility in maintaining healthy lives for their children, the important question to address here is whether parents/guardians feel they have got enough support to help them undertake this obligation.

6.5.3 Support for parents/guardians in maintaining a healthy weight for children

Most parents/guardians in the current study did not feel that they had enough support to help children maintain a healthy weight. Parents/guardians pointed towards the lack of an early recognition system to identify those children who may be at risk of weight problems. They felt that the current system waits until weight problems have become worse and that is when a child is diagnosed with the problem. Given the challenges of losing weight, once the weight problems set in, it means the individual could spend the rest of his/her life struggling. A parent speaking about the availability of support noted:

> ……there is definitely not enough support for parents, because it is not until it becomes an issue when it is already too late that you get told your child is overweight and things. I mean for anybody to put on weight is easy but then to get it off and keep it off is nearly impossible, isn't it?.....For instance if I took him to the doctors, they wouldn't normally say anything until it was too late then they would say he is overweight for his age, and it is all left to the parent to sort out (parent 02 – child obese/overweight).

Parents/guardians however reported relying on each other in their neighbourhoods for support, especially regarding the weight issues of their children. This is clearly demonstrated by the two families in the current study that narrated their story about how they rely on each other for support. These two families were on the extreme ends regarding weight status of their children. One family had a grossly underweight child whose feedback letter had come back showing that she was underweight and the other family had a grossly overweight child whose feedback letter had come back showing that she was overweight. These two families relied on each other for support and below is what they narrated:

> ….. I and my friend NJ…. we are very open and we back each other up where the kids are concerned. At the minute she has been having a problem of unhealthy eating not because she is too big or whatever but just because she didn't mind what they eat as a family. We sometimes prepare joint meals for our children. We have been insisting on portion sizes and encouraging our children to do exercises and as a result her daughter who was a little bit overweight has lost half a stone in weight just through a bit of guidelines. Whereas my daughter has gained some weight too.....the important thing is educating the children because they learn to support each other. For example, my daughter would say to NJ's daughter that you have already had a biscuit and you can't have another one, so in that way she supports her. Me and NJ feel proud because we have educated our children in that way because they understand what healthy eating is and the importance of exercising. This little bit of education can help families (parent 04 – child underweight).

These two families provide a classic example of parents/guardians relying on each other for support regarding their child's weight status. On many occasions the families reported that they gather together and cook a meal as two families, involving their children in the process and teaching them the skills of cooking; they organise country walks alongside other activities. It is important to note though that one of these families (the one with the underweight child) participated in the Change for Life project. The mother noted that the awareness she had received from participating in the project enabled her to get on board and educate another family, an achievement she was proud of. This further supports the importance of initiatives to educate parents/guardians on how to help their children live a healthy lifestyle. This could also highlight the importance of getting families to work together at local level.

Parents/guardians expressed their interest and support for the initiatives that provide support by informing their children about weight issues, especially in school settings. Parents/guardians cited as reasons the fact that it is the children who are bound to live with the consequences of weight issues for the rest of their lives, so they ought to be given full information about weight issues. Besides, catching children early and giving them the right information about maintaining healthy weight could produce positive outcomes. But caution should be taken not to do this out of context, which may make children feel as if they have been singled out.

> ……..I think talking to children about weight issues is good, but it's got to be done not in exclusion. Like if the intervention is going to be successful, it needs to be like a family thing. You know, kids are sensitive about themselves but they can be insensitive about other people so anything different, they would be very aware of it. You know they want to be like all the other kids out there, you know it's what kids are like I think. But it's also important you know from my point of view they need the information because it's their lives. They are the ones who are gonna have to sort of live with the consequences of this for the next 30 or 40 years so they should be talked to. The detail of it in principle should aim to provide good education for healthy lifestyles for children (parent 03 - child of ideal weight).

On this, another parent echoed the need to emphasise healthy lifestyles rather than sticking on numbers to define those who have weight problems and those who do not have the problems.

> …….I would love people to speak to the children after school and out of school and things like that about weight related issues, as long as it is dealt

> with sensibly, so it is not drummed into them that you have to be a certain weight, or they have to be the normal or like the average. Sometimes you are above average or below average and that is alright, but it's just you have to maintain a healthy lifestyle, and I think that is what should be stressed - the healthy issues of it, not the figures... if you are above this number you are wrong or if you are below this number you are wrong....(parent 09 – child obese/overweight).

Although on the whole it would appear that many parents/guardians would support this idea, a lot of them were caught in a dilemma when they received the weight feedback for their children from the PCT.

It is quite clear that most parents/guardians had no clue about what to do next when they received the weight feedback relating to their children. Parents/guardians (especially of children who were indicated to have weight problems) were afraid of showing this information to children for fear of frightening, scaring and worrying their children. But, at the same time, in their role as parents/guardians they felt that they ought to be doing something about this letter. More importantly, a lot of parents/guardians perceived their children's attitudes towards food and physical activities as being positive. Therefore they thought that showing children information that portrays them as being overweight/obese would affect their children's attitudes towards food and exercise. So those parents/guardians who thought like this instead just threw the letter in the bin (as already mentioned above). One parent whose child received feedback saying that she was overweight expressed concern:

> …..I think you've met DJ, she is probably one of the smallest in her class, and to have that black and white in bold lettering was a bit of a.... sort of.... goodness me! If I showed her this, would she then go "Oh goodness I am fat!", and then turn……what I think she has a very healthy attitude to food. She doesn't over-eat; she is very sensible about sort of treats and things like that and I think she has got a very positive attitude towards food. But I think if she had read that letter I would be a bit scared that she would maybe change her attitudes, so I just threw it in the bin straight away (parent 01 – child obese/overweight).

As already discussed in the above sections, this underscores the importance of proper communication of the height and weight feedback to families in order not to cause panic, worry or annoyance but rather to bring awareness about the need to do something regarding the eating habits and physical activity levels of the children. Parents/guardians were keen to have support in this role from local authorities, health practitioners and neighbourhoods. There have not been many studies conducted to examine parents'/guardians' feelings about the support they have in helping children maintain healthy weight. However a lot has been done to indicate

the importance of parental support in combating weight problems among children. As discussed in Chapter two, earlier studies by Golan *et al* (1998) investigated the impact of parental support in the treatment of obesity. They studied sixty obese children and found that using parents/guardians as the agents for change was superior to approaches that target children. Later, Smolak *et al* (2004) were able to show that comments made by parents/guardians directly to their children significantly influenced the attitudes and beliefs of children relating to weight. They thus concluded that prevention programmes need to target such behaviours of parents/guardians. Golan and Crow (2004) also demonstrated that in longer term treatment of childhood obesity, targeting parents/guardians as the main agents of change is vastly superior to the approaches that target children directly.

Thus providing parents/guardians with the support they need in doing this should be considered a top priority in health promotion. However the current study has been able to show that parents/guardians feel they do not get enough support to help them ensure that their children maintain a healthy weight. Parents/guardians identified a number of ways in which they could be supported, some of which include increasing awareness among parents/guardians to detect weight problems in their children early.

> .....awareness is the first issue. If you are not aware that your child is overweight, then you are not going to seek the solution, if that makes sense.... (parent 03 - child of ideal weight).

Secondly parents/guardians expressed a need for government involvement through passing legislation that banned advertising of unhealthy foods to children, introducing big taxes on unhealthy foods etc.

> .....the government needs to ban advertising unhealthy things to children, they should tax fatty foods and other unhealthy foods. Changing the overall environment is necessary. This may not be a direct intervention but certainly it would make it easier for parents to sort of control what their kids are eating (parent 05 - child of ideal weight).

Furthermore parents/guardians indicated a desire for more information about the healthier choices available, from which they could choose, alongside support from health practitioners, citing that they shouldn't be left to their own devices in matters related to the weight status of their children.

In a nutshell, interviews from the current study indicate that addressing challenges of parenting in modern societies should take top priority in interventions that aim to

combat weight problems in children. However, special attention should be given to factors contributing to the obesogenic environment over which parents feel they have little control. The next section explores fully the factors contributing to the obesogenic environment posing more challenges to parenting in the modern society. But first the summary of the key findings under the major theme – challenges of parenting in the contemporary society is presented in Box 6.2.

Box 6.2 Summary of key findings under the theme – challenges of parenting in contemporary society

- Parents in most families have lost the ability to judge whether or not their children are underweight, ideal weight, overweight or obese. This has been attributed to:
    - The changes in the average weight of children in the UK towards overweight.
    - Misconception about the right size, especially in families where almost all people in the family and in the neighbourhoods are overweight.
- Most parents feel that children's weight status is the responsibility of parents and that the blame entirely rests on the parents if children are overweight/obese.

- Many parents/guardians interpret good parenting as being able to take on a policing role over their children. This has meant:
    - Exercising control over children's freedoms, including what they can and can't eat, what they can and can't do etc.
    - Parents/guardians spending a large part of their time overseeing their children's activities.

- Most parents/guardians did not feel they had enough support to help their children maintain a healthy weight. They felt:
    - Parents/guardians are often left to their own devices to fix weight problems.
    - There isn't enough awareness among parents/guardians to recognise weight problems early on in their children's lives.
    - There is a lack of knowledge and information about healthier choices and alternative options to fix weight issues.
    - Parents/guardians rely on each other for support.

- Parents/guardians expressed interest and support for initiatives that aim to provide information about weight issues in school settings, citing reasons such as:
    - It's the children who are bound to live with the consequences of weight problems for the rest of their life, so they need to be given information
    - Catching children early and modifying their behaviour could have a positive impact on weight issues.

- Parents/guardians had no clue about what to do next when they received the weight feedback for their children. Parents/guardians acted differently:
    - Some parents/guardians whose children had been indicated to have weight problems chose not show the feedback to the children for fear of frightening, scaring and worrying their children.
    - Parents/guardians were caught in a dilemma because they felt an intrinsic guilt that they ought to be doing something about the feedback but showing it to the children would be a big risk, as it could spark negative attitudes about food and exercise among their children.

6.6 The 'obesogenic environment', a challenge for childhood obesity control.

> …..overall I think the environment in which children grow up today is negative. If for example the TV adverts were truly reflective, you would have kids with tooth decay, who are overweight, with really unhealthy parents on the adverts, but no... instead it's always with really good looking, really slim, really inspirational sort of, promoting something which is pretty unhealthy…. (parent 03 - child of ideal weight).

The thematic content analysis of the interviews conducted with both parents/guardians and children in the current study identified a number of factors that contribute to the creation of an 'obesogenic environment'. This is a term first coined by Egger and Swinburn in 1997 to describe a complex network of social, biological and environment factors favouring the increase in weight in contemporary societies (Egger and Swinburn, 1997). It has been described in detail in the Foresight report (Foresight, 2007). 'Obesogenic environment' is not an *in vivo* or analytical term that was used by participants themselves, but serves here as an umbrella category, bringing together discussion around a range of issues which parents in particular noted as affecting the environment within which they were raising their children. The rest of this section discusses the various factors that were commonly mentioned by parents/guardians to be responsible for the increase in childhood obesity, which in essence are part of the obesogenic environment, and the first is food choices and eating patterns.

6.6.1 Food choices and eating patterns

In their accounts, parents/guardians quite often talked about food choices and availability of fast foods.

> The trend now is towards fast foods and everything is like in a hurry. It's like everything is sort of for quickness, microwave meals every day. It's just the way things are now, fast foods are more chosen by many families (Parent, 01 – child obese/overweight).

It is arguable that there is a fast moving trend towards choosing ready meals and fast foods among families in the UK, a shift which is contemporaneous with the growing trend towards childhood obesity (Foresight, 2007). Nowadays, families increasingly find it easier to buy food from supermarkets. In their quest to attract customers, a lot of supermarkets have developed new technologies for making ready meals that only need heating in the microwave. Such foods can be very tasty and this, coupled with the convenience they represent, means that a lot of families in

the UK and the developed world have found themselves opting for them. Parents/guardians also noted the increasing number of fast food shops on their streets, for example MacDonald's, KFC among others. These not only provide cheap, fast foods, they also make sure that the foods they provide are tastier by adding more fat and salt at the expense of being healthier. Such outlets have become children's first choice at the expense of healthier foods. In an environment like this the issue of healthier food choice among families poses a very big challenge. The key question that families are constantly confronted with is whether to go with the cheaper, tastier, but unhealthier options or to go with the more expensive healthier options. To many families it is better to go with the cheaper, tastier options. This is usually exacerbated by the lack of knowledge about what the healthier options would be. Worse still, these companies are given permission to advertise these foods to children, making it difficult for parents/guardians to deny their children these foods when they see them advertised on TV. However parents/guardians noted that most of them would find it difficult to say 'no' when their children make demands for the foods advertised, although some parents/guardians said they would say 'no', as one of the participants noted below:

> .....I think that children are targeted as in advertising for different foods and what's popular. Like I said, when I go round the supermarket the kids are like, "Oh can we have this? It's like whatever is being on television." And you've got to sit and say no cos it is like full of big numbers of fat or it is not good for you, and it is not because I don't want you to have it or I don't want to deprive you of it but it is not good for you. So I think a lot of parents - if they don't realise that those things are bad for their children - they will just get them, because that is what the children want and yet it's not actually what is good for the children (Parent 16 – child obese/overweight).

Harris *et al* (2009) in a systematic review documented the rapid growth in food marketing to children. Particularly, they noted that most foods advertised to children are unhealthy. Anderson and Butcher (2006) studied the impact of TV advertising on food choice in children and concluded that it sparks children's desire for the advertised food. This was also observed by Borzekowski and Robinson (2001). Dennison and Edmunds (2008) have concluded that evidence from cross-sectional, longitudinal and intervention studies indicates that TV advertising is strongly associated with childhood obesity. They argue that TV advertising modifies children's preferences, desires and portion sizes, all of which may subsequently lead to increased calorie intake. Given reduced physical activity levels, this obviously leads to weight gain among children. These findings are in line with the parents'/guardians' accounts in the interviews conducted in the current study. One parent noted:

> .....children when they see anything advertised on TV the next day they want it. Obviously TV advertising affects children's preference and desire for fast foods and it is not fair, if you know what I mean, to deny them, because it is what they want....but yeah, as I said, it's all because of the TV (Parent, 10 – child obese/overweight).

Roberts (1999) in the Kaiser Family Foundation report showed that in the developed world, close to 88% of the households have more than one TV and 77% of children have a TV in their bedroom. This indicates that the scale at which TV advertising potentially affects food choices in families is huge. However the choice and eating patterns in many families in the contemporary society seem to be influenced by many other factors, but perhaps the most frequently echoed in the interviews in the current study were the 'busy-ness' of modern lifestyles (discussed in the next section).

6.6.2 Busy lifestyles

Societal changes in the UK and other developed countries have meant that work patterns can involve parents working different shifts over 24 hours and for 7 days a week. A lot of activities are also organised for children after school hours. It has therefore become increasingly difficult for families to think of having a meal together or even parents/guardians to think of cooking a meal from scratch with proper ingredients for children. Due to busy lifestyles families increasingly choose ready meals or fast foods for convenience. In one case a child reported:

> ….my dad works at night, so when I go back home he puts me a pizza in the microwave to eat before he goes to work (child, 18).

It is therefore arguable that busy lifestyles are a precursor for the choice of ready meals and fast foods in UK families today. A study by Anderson *et al* (2003) using the parent and child data from the National Longitudinal Survey of Youths (NLYS) found that in households where both parents/guardians are in full-time employment, there is a high preference for fast foods because of the convenience. These findings are well supported by the accounts from the interviews of both parents/guardians and children in the current study. For instance one parent noted:

> …..I have just recently gone back to work and, yeah, a very busy lifestyle. You come in from work sort of right at tea time. If the children have got after school events so now they want to go out with their friends and things like that or even just home work in general…. You just want to put something on the table as quickly as possible and sometimes it is not always the healthier option.....you just try and sort of get something on the table quickly for them..... (parent 08 – child obese/overweight).

Spending more time at work reduces the ability of parents/guardians to prepare healthy meals for the children. Anderson *et al* (2003) commented on the impact of work hours on the food choices of most families in the developed world, leading them to opt for quicker ready meals which may not be as healthy as home prepared foods.

Some parents/guardians were not convinced, however, that there is any effect of fathers' and mothers' working shifts or long hours on food choices or indeed on childhood obesity. They thought that there could be other more important factors such as poverty and low educational attainment that could be strongly associated with childhood obesity. A parent in one interview noted:

> .....I don't think it's got anything to do with mothers' work. You know if you look at some of the poorer states where the mothers don't work I would guess the kids are just as obese as some of the wealthier states where mothers do work. I think it's got much to do with poverty and education, I mean I don't know how accurate this can be but if you demographically plot the results from this sort of study, I would guess there is a correlation between poverty and obesity (Parent 07 - child of ideal weight).

This study provided evidence towards the claim that over time, some parents/guardians in developed countries including the UK have lost the ability and skills to cook. A lot of parents/guardians admitted lacking knowledge about healthier foods and also not having the required tools and equipment in their households that would help them to cook a healthy meal. On this issue one parent noted:

> .....I think everything is down to the parents really. I wouldn't put anything on anybody else. It may be ignorance. Like I said, a lot of parents today lack cooking skills and they can't be bothered, can they? The other thing I suppose is the lack of the required equipment to do meaningful cooking at home. Some people can't just be bothered to acquire them (parent 05 - child of ideal weight).

Contemporary societies use advanced technology in an attempt to enable individuals to pursue their busy lifestyles, yet this is now believed to be one of the factors in the 'obesogenic environment', promoting sedentary lifestyles leading to the increase of obesity. The next section discusses technological advancement.

6.6.3 Technological advancement, a precursor for sedentary lifestyles.

This is a broad term, but here it has been discussed in relation to childhood obesity. In developed countries, technological advancement has led to the invention of computers, computer games, televisions, cars etc. There have been a change in the mode of transport by which parents/guardians commute to work, and

subsequently, there have been changes in the mode of transport by which the majority of children get to schools. A lot of parents/guardians nowadays prefer dropping their children at school and picking them up by car. A mother in the interviews noted:

> .....you have to drive your children, if you are going straight to work and things. I do drive mine to school and pick them back up. I always go to work straight from school so it's obviously circumstances that force you to do that. I mean if there was another alternative it would help but at the moment a lot of parents do that, there is no option (parent 02 – child obese/overweight).

Comparison studies by Corless and Ohland (1999) have shown that only 9.9% of travel made by children were by walking or cycling in the mid-90s as compared to 15.8% in the late 70s. A survey by Russonello (2003) about the attitudes of Americans toward walking discovered that slightly more than half of the parents/guardians drove their children to school, slightly more than a third let their children take a bus to school while only a very small percentage reported their children walking and cycling to school. There are similar trends in the UK and other industrialised countries. It is obvious that this tendency has the potential to significantly reduce children's physical activity levels, thereby potentially exacerbating childhood obesity. Cooper *et al* (2003) demonstrated the negative effects of this on the physical activity levels of children in the UK. They found that children who walked to school were significantly more active than those who were driven to school. Although no causal link was established, they concluded that walking to school may significantly improve children's physical activity levels, especially in boys. In many ways, findings from the parent/guardian and child interviews in the current study reinforce the changing trends in the way children nowadays travel to school that Corless and Ohland (1999) observed. Many children indicated that they are dropped and picked up to and from school every day by their parents/guardians. One child, when asked how she gets to school every day, reported:

> .....it's my mum who drops me at school when she is going to work and usually picks me up when she's coming back from work (child 03).

There is no doubt that this practice is more likely to reduce physical activity levels of children while encouraging sedentary lifestyles which have been proven to have a negative impact on efforts to combat childhood obesity.

It is also evident that with the invention of computer games the mode of play among children has significantly changed over the years. A lot of children no longer play outside but instead sit in their bedrooms and play computer games. One child noted:

> …at home I have got my own living room and I have my Xbox. After school my friends usually come and we play computer games like pool, football etc (child 09).

A lot of children admitted that they play more computer games than games outside. This is contrary to the way children used to play a few decades ago. One parent reported:

> …..I mean when I was 7,8, 9 I would go out and play football all day, come back and get my dinner, go out and play again, come back and get my tea go out and play again you know, until when it gets dark.....I think that is how society has changed. The informal activities are probably less now than they were, and a lot of activities tend to be more structured (parent 03 - child of ideal weight).

Parents/guardians attributed this transition to societal changes, but these pose a real challenge to the efforts geared towards increasing children's physical activity levels. Undoubtedly increasing children's physical activity levels while reducing energy intake would reduce weight gain thereby reducing childhood obesity. But the changes in the mode of play for children due to technological advancement, put simply, only promote sedentary lifestyles which undermine the efforts to increase activity levels especially among children. This has also been observed in a recent study by Pearson and Biddle (2011).

Again in relation to technological advancement, another important issue to explore is the time children spend watching TV. It was echoed across the parent/guardian and child interviews that children enjoy watching TV and they spend a lot of time watching programmes on TV. This has the negative impact of promoting sedentary lifestyles too. Studies investigating the relationship between TV viewing and childhood obesity have identified a statistically significant association between time spent watching television and the prevalence of childhood obesity (Dennison and Edmunds, 2008; Jackson *et al.,* 2009). In some studies it was concluded that for every hour spent viewing television there was a 2% increase in the prevalence of obesity (Dietz and Gortmajer, 1985). Apart from exposing children to the advertising of junk foods and therefore sparking their desire for these foods, TV viewing and computer gaming can potentially eliminate physical activity and promote sedentary lifestyles which are key to increasing the rates of childhood obesity.

Many parents/guardians in this study admitted not imposing any controls on their children over watching TV or playing computer games. In relation to this a parent said:

> …..children these days spend a lot of time watching TV, on computers and not as much time playing out on the streets. If for example I was going out for a few hours I could leave him and he is just gonna sit and watch TV. He is not gonna say, I better get up and do some exercise and run around the block. He is just gonna put his Xbox on or something, and there is gonna be a lot of children at that age who are gonna do that. But still parents aren't gonna do anything to stop them. They just can't be bothered (parent 02 – child obese/overweight).

It should be understood, that most parents/guardians would want their children to be as healthy as possible and to grow into healthy adults. This was echoed through the interviews by parents/guardians. For instance, one parent noted:

> .....obviously you want your child to be healthy and to grow into a healthy adult and to have the best opportunity to live as a good quality of life as long as they possibly can.... (parent 03 - child of ideal weight).

It is worth noting at this point, however, that, although this is the aspiration of many parents/guardians, on many occasions they have had to do the opposite, whether intentionally or unintentionally, in order to adjust to circumstances. Parents/guardians identified a number of issues that they have got to negotiate as they bring up their children into adults. Many of these issues, for instance child safety, availability of safe play areas etc have been mentioned by several researchers to be contributing to the obesogenic environment and the next sub-section discusses some of these issues.

6.6.4 Child safety and fearfulness

The most common factor that parents/guardians noted to be pushing them to drive their children to and from school and restricting their outdoor play opportunities nowadays was child safety. One parent noted:

> .....a lot of it is fear. A lot of it is sort of child safety, but yes at some point you've got to let your children out into the big wild world and let them get on with it, but I know - just from my own experiences of my two being at primary – at this age generally parents do accompany children to school and back (parent 06 - child of ideal weight).

There is no doubt that a lot of parents/guardians think the world today is not a safe place, especially for children. In terms of walking or cycling to school, parents/guardians unanimously noted that in many of their areas there were neither

safe walking paths nor safe cycling paths through which children could commute to school. Yet most parents/guardians indicated that they would be willing to let their children walk or cycle to school if there were safer paths for children to walk and cycle. One parent on that issue said:

> I do like my daughter to walk to and from school and I think they are at an age where they can. See if there were safe paths and cycle routes that they could take and I knew it would be safe route for her to take, yes I could quite happily let her walk or cycle to school.....(parent 14 - child of ideal weight).

In their article about childhood obesity, Maziak *et al* (2008) noted that making cities amenable for walking and cycling may not only reduce obesity levels but can also reduce air pollution and traffic delays. However they further noted that strong evidence from research identifying readiness for behavioural change among the masses will always be needed in order to catch the interest of policy makers to put this into practice. Mendoza *et al* (2011) have highlighted the potential impact this could have on the raising of physical activity levels in children.

These interviews also uncovered the issue of safe play areas in the communities where children live. However on this issue, parents/guardians were divided. Some thought that there weren't enough safe play areas where children could go and exercise while others thought there were enough play areas for children. This highlighted inequalities and disparities among communities and it was identified that these could be the reasons why parents/guardians had contrary views about the issue of play areas. For example one parent noted:

> .....that's my big fear, especially living where we live, sort of on this bank, there is no-where safe that the children would go out and play. They play sort of in the back garden and they invite friends their age around. I sort of work with children as well and I have seen sort of some child protection issues and I am very wary of where I allow my children to play. So that's the big thing....with my two I am very conscious of where they are and sort of the areas that they are playing in, and particularly around here there isn't really an awful lot locally sort of within walking distance, that the girls can go to, so we literally sort of put their bikes on the back of the car and take them to Harrington Park or to Chester Park and things like that, but the only time they get to do any cycling and things like that is when we have to make the effort to take them away somewhere to do it (parent 01 – child obese/overweight).

These issues were highlighted in a study conducted by Russonello (2003). Again the lack of safe play areas, safe walking paths and cycling tracks were mentioned as some the reasons that hindered parents/guardians in USA letting their children walk

or cycle to school or even go out and about on their own to play. The findings in his study have been reinforced by the interviews conducted in the current study.

On the other hand however there were a handful of parents/guardians who thought there were enough play areas where children could go. Again this may illuminate the inequalities that exist within different communities. On this issue a parent commented:

> .....if you wanna take your kids out to get exercise, there is lots of places to go. We've got a dog and we walk our dog every day and we go down, there is a big lake down there, we could run around the lake. We run up the hills in the woods and there is farms, isn't there? We've got a dog for that reason. To get the children active we can give everyone a dog..... (parent 13 - child of ideal weight).

It is important to note that this parent was from an affluent area. This could indicate that in more affluent communities the services are available and on top of that, parents/guardians from affluent areas can afford to get incentives for their children such as buying a pet that would encourage them to go out and do exercise like walking, running and so on. In addition, several structured activities can still be made available to the families in more affluent communities. Another parent commented:

> ..... I mean we've got a park down the road. With my daughter she exercises quite a lot, she dances three times a week, she goes swimming once a week, the park has more formal and structured activities if that makes sense and again the park down there has a basketball court, so if they wanted to do stuff like that the facilities are available.....(parent 03 - child of ideal weight).

Although it can clearly be observed that parents/guardians hold different views on the availability of facilities for their children to exercise, which could be a consequence of socio-economic disparities, there is general consensus about fears for the safety of children, especially when they are left on their own. Almost all parents/guardians (both from affluent and poorer areas) held the view that the environment in which children live nowadays is generally not safe for them. I would suppose the question of interest here would be whether crime against children has been increasing in the recent past. In answering this question there are two important aspects that need to be taken into consideration, namely the statistics regarding crimes against children and other factors such as media coverage. As a matter of fact statistics show that crime against children hasn't been increasing; it is

actually less common than it was many years ago (Finkelhor *et al.,* 2010). However media coverage nowadays means that when a crime is committed it gets well reported and sometimes over exaggerated. Although not many parents/guardians acknowledge this, there were a few parents/guardians who quite clearly brought it out in their accounts. One parent commented:

> Crime is less than it was apparently, according to statistics, but when it happens it's really well reported. Therefore people are a lot more aware of it and I am sure there are probably as many paedophiles now as when I was a kid you know, it's just that reporters now report it more (parent 03 - child of ideal weight).

Parents/guardians who hold this view felt that over sensitising people about crimes against children has led to legislation that has put a further strain on parenting. They feel that a lot of people who would organise activities for children (such as football or other activities) are put off by the many checks they have to go through before they can be authorised to work with children. To them the main danger for children playing outside nowadays is traffic rather than crimes against children. They reckon that due to the excessive checks that people have to undergo before they can work with children, there is a real danger of people giving up organising activities for children, which will only encourage the sedentary lifestyles that can potentially lead to an increase in childhood obesity. On this issue a parent commented:

> ....some few years ago you wouldn't have thought of people needing CRB checks if they were taking kids for football or regularly just dropping them off but it's a bit excessive really. It does seem to be like a big lack of things to do. I suppose for children playing out, now the main issue is traffic. If I am honest, the likelihood of getting abducted is quite low but the likelihood of getting knocked over by a car is quite high and that's more of an issue. These streets are so busy….. you saw how busy sort of the roads up there are (parent 05 - child of ideal weight).

These parents/guardians feel that media exaggeration of threats to child safety makes things difficult, especially with current busy lifestyles. Parents/guardians would be happy if organisers of activities or other parents could pick up and drop their children home. But quite often this is seen as impossible, as many people wouldn't hold the right checks to do this[7]. As a consequence, parents/guardians who cannot find time to drop and pick up their children from services/activities simply

[7] The research was carried out at a point when discussion of the need for CRB checks even of a parent offering lifts to other children going to the same activity, was under discussion in the press.

leave their children at home playing on computers and watching TV, with all the associated negative outcomes that have already been mentioned.

Having said that, there were some parents/guardians who shared a different view about child safety. They believed that child safety nowadays is not a matter of media exaggeration; it is real and an immediate threat to children. This does not only hinder most parents/guardians from allowing their children to go out on the streets on their own, it also creates worries among parents/guardians, sparking controlling behaviours especially about where the children can go and where they can't. For children this means getting onto their computer games as the only means of playing and enjoyment, as one child notes below:

> .....no, cos (because) my dad won't let me to go out with my friends to play away from home so when I go back home, after having something to eat and I get out my Xbox and play, but sometimes even my friends come home and we play together (child 09).

Yet for parents/guardians it means 'good parenting'. This issue of parenting has been explored more elsewhere in the previous sections. It is certainly a very important aspect today as far as child health is concerned. Still on the issue of child safety a parent reflected:

> .....I am just fairly aware of what can happen, so I am very cautious about where I allow the children to go outside without my supervision, and I still think they are very young to be sort of out and about on their own.....(parent 07 - child of ideal weight)

A lot of parents/guardians who felt this way also did not think that it is wrong to do rigorous checks on the people dealing with their children. They felt that if someone did not have anything to hide then he/she should not be offended by being rigorously checked. In any way this would be good for the child safety and for their own safety. This has become a societal change that parents/guardians must tell their children to be careful with their safety, as one parent noted:

> ….. you know people in society today tell the children the way things are. Well I know if you go in the school to do anything you have to be sort of checked. Of course if you haven't got anything to hide it shouldn't make a difference, should it? I suppose that is the way society is today; parents have to be vigilant...(parent 02 – child obese/overweight).

In schools children as young as 4-5 years are taught that one of the rules of life is 'we never talk to strangers'. Much as this could be helpful if the threat of child safety

is real, it could equally be detrimental to societal cohesion and values especially when the threat of child safety is due to media exaggeration. Dixey (1999) in her study about keeping children safe discussed at length issues underpinning child safety. She noted that parents/guardians spend a significant amount of their time keeping children safe. Consequently most parents/guardians reported either dropping or escorting their children to and from school. This did not only make daily routines for parents/guardians difficult, it also caused anxiety to parents/guardians, especially those that had children in different schools. Yet parents/guardians were willing to shoulder this burden as they saw real danger lurking in the form of abuse, accidents etc if children were out of the parents'/guardians' sight and custody. Of course Dixey's findings are not different from the findings in the current study about the apparent parents'/guardians' perception of their children's safety. While there have been debates about whether or not children today are actually at more risk of danger compared to children a few decades ago, it seems quite clear that parents/guardians in the current study hold the view that their children today are at a higher risk of being abused or run over by a vehicle. The immediate consequence of this has been the increased surveillance of children by their parents/guardians which comes with curtailing children's activities, reducing their independence, increasing worry and anxiety among parents/guardians and severe conflicts between parents/guardians and their children. Several researchers and commentators have discussed the negative impact of creating a generation of children under surveillance (Dixey, 1999; Furedi, 2001; Valentine, 1997; Wyness, 1994). This sort of surveillance is likely to affect children's development and intelligence (Furedi, 2001).

Considering this from a wider socio-perspective, parents/guardians do not carry the blame for putting their children under surveillance alone. This situation has been encouraged by the government and local authorities. In 1995 the Department of Transport in the UK identified that its main aim was to teach parents/guardians to learn the risks that their children could face and therefore take responsibility for the safety of their children (Department of Transport, 1995). Obviously parents/guardians in the current study, although they were aware of the actual facts about child safety, always felt that their children were at greater risk. This is largely due to media exaggeration and the government programmes that aim to make parents/guardians more aware of the issue of child safety under the guise that parents/guardians should take more responsibility to watch over their children. By so doing it seems like the government is missing the point, it feels like it is the children

and their parents/guardians that have the problem and not the built environment like the unsafe roads, lack of safe play areas, increasing traffic etc. This has also been echoed by Dixey (1999). It is arguable that children's safety must be addressed from the point of ensuring safe paths and cycle routes, safe play areas, regulation of vehicle speed etc rather than encouraging parents/guardians to curtail the children's activities and put them under 24 hour surveillance. The current study identified that parents/guardians shoulder the responsibility of ensuring child safety whereas the threats to child safety come from outside, completely out of their immediate control. This was also identified by the Leeds study by Dixey (1999).

This emphasises the challenge the 'obesogenic environment' places on parenting in contemporary society. Yet this challenge is made worse when parents/guardians do not have proper knowledge to assist them easily access services within the health system. The next section discusses accessing help within the health system. But first Box 6.3 presents a summary of the key issues under the major theme – the 'obesogenic environment', a challenge for childhood obesity control.

Box 6.3 Summary of the key issues under the theme of 'obesogenic environment'

- Food choice among UK families has shifted towards fast foods and ready meals. This trend has been due to a number of factors including:
  - TV adverts targeting children
  - Busy lifestyles of parents/guardians
  - Parents/guardians losing skills of cooking
  - Lack of equipment for cooking in families

- Technological advancement has changed the lifestyles of many families in the UK. This has meant that:
  - Children spend most of their time playing computer games and watching TV at the expense of outdoor physical activities.
  - Most children travel to and from school by car which reduces their overall physical activity levels.
  - There are a lot of supermarkets and shops selling fast foods and ready meals in close proximity to many families.

- Issues of child safety have led to parents/guardians spending much of their time policing their children. The perceived danger has been attributed to:
  - Lack of safe walking and cycling paths for children to commute to schools, prompting parents/guardians to drop them or escort them.
  - Lack of enough safe play areas where children could go for outdoor activities.
  - Media exaggeration of child safety issues.

- Parents/guardians in most families in the UK are willing to let their children walk or cycle to schools provided there are safe routes to take.

6.7 Accessing help within the health system subsequent to weight feedback from the measurement process

> .....we didn't really know a lot about it. We thought it was a new national curriculum out about being measured and weighed. At the time we knew it was gonna happen but we didn't know when and then it wasn't really until the letter came home…. (parent 02 – child obese/overweight).

Another important theme that came out of the current study interviews was accessing help within the health system in respect of the NCMP. Issues about the knowledge of the system and how to find help and support subsequent to feedback were pertinent, as discussed in the sections that follow.

6.7.1 Knowledge of the measurement programme and its role

It was quite clear that parents/guardians lacked knowledge about the entire NCMP. They did not know what the purpose of this programme was, who was responsible for it and how it was being conducted. It follows therefore that they could not tell whether or not they felt it was legitimate to measure and weigh their children at school. When asked about the role of the measurement programme, it was quite clear that most of the parents/guardians were simply guessing. Some parents/guardians thought it was a new national curriculum about being measured and weighed; others thought it was intended to estimate the average weight and height of children. For instance some parents/guardians, when asked about the role of the measurement programme, said:

> I don't really know why it is being done. Is it just to find sort of the average whether most children these days are above or below the expected weight or height measurements.....? (parent 08 – child obese/overweight).

It also came out quite clearly that many parents/guardians did not know who was behind this measurement programme. Some of the parents/guardians thought that the school was responsible for the programme, others guessed that it was the responsibility of the Department of Health, while the majority of those approached for this study thought that Teesside University must be responsible! For instance some parents/guardians when asked about who was responsible for the measurement programme responded:

> ….I would guess it would be somebody in the Department of Health somewhere who would be behind it… (parent 03 - child of ideal weight).

> ….I don't know. Maybe it's the school responsible for it (parent 06 - child of ideal weight).

> ….is it not Teesside University doing this as well? You know we have been receiving some packs from Teesside so we thought it is the one responsible for it as well (parent 09 – child obese/overweight).

It is important to note that not only parents/guardians, but also children demonstrated considerable lack of knowledge about the NCMP, the purpose of it and why it was being done. In a number of instances children told of their worry before they entered the room where the school nurse was measuring and weighing because they thought they were going to 'get needles done', i.e. be immunised. In fact interviews with children identified that moments before being measured, the classroom was often in shambles, with children relying on one another for information about what is about to happen to them. Children reported being nervous, worried and scared just before going into the room where the school nurse was. A child said:

> .....we were in the classroom and when the teacher came in she said the nurse is here and everybody thought that we are getting the needles done and it will hurt. Everyone got really scared. Then we went and we got weighed and measured and some other people were down pretending that they were doctors just to scare everybody (child 01 – child obese/overweight).

More on the children's reactions to the measurement process has been covered elsewhere in Section (6.9) – impact of the measurement process on the mental wellbeing of children. However it's worth mentioning here that these findings indicate that use of medical personnel in surveillance programmes risks medicalising the entire programme, which may lead to undesirable outcomes. The current study is not the first to identify misperceptions of the National Child Measurement Programme. Earlier studies by Shucksmith *et al* (2009) reported complex multiple misunderstandings of the purpose of the NCMP among the children, parents/guardians and the school authorities.

Many parents/guardians were unclear whether this programme was a surveillance one or a screening one. Most parents/guardians viewed this programme as a screening one although efforts were made to ensure that they viewed it as a surveillance programme, as the Department of Health insists. However, given that the recommendation of the Department of Health to PCTs is to routinely feedback the weight status of children to families, it is difficult not to view the entire NCMP as

a type of screening programme. To this end a lot of questions were raised about this programme, given the fact that there aren't many interventions for childhood obesity that are known to be effective. One parent asked:

> ....there is a lot of childhood obesity around isn't there and it is a problem that is getting worse but there aren't many known interventions around, so don't you think that screening children for obesity is a bad idea? (parent 13 - child of ideal weight).

Of course this and other questions about the fact that the NCMP has become a screening programme yet with no available interventions for those deemed to have a problem at the end of it, have been asked by many other researchers and commentators. Summerbell *et al* (2005), in their systematic review of the effectiveness of obesity interventions, reported a poor evidence base when it comes to identifying what works in treating or preventing obesity. These findings lead to pertinent questions as to whether we should be identifying children at risk of overweight when clearly there is nothing much that can be done for them. The UK government dislikes the description of the NCMP as a screening programme, not least because they will be aware that it does not satisfy the National Screening Programme Committee criteria (Lake, 2009; NICE, 2006; Nihiser *et al.,* 2007; Summberbell *et al.,* 2005; Shucksmith *et al.,* 2009).

Yet the current study also identified that when parents/guardians especially those whose children have weight problems learn of such surveillance or screening programmes, they anticipate receiving some form of treatment, support or help. Many parents/guardians whose children had been labelled as overweight/obese clearly wanted some answers from the researcher in the current study. For instance some parents said:

> .....I would say it would be nice to get some answers about what we are doing wrong, because all along I thought I was doing the right thing..... (parent 02 – child obese/overweight)

> .....I am all for any info that people can give me and advice that people can give me about that kind of thing because as a child I struggled with my weight as well and sort of still do. Maybe I can help my daughter not to go through the same…..... (parent 01 – child obese/overweight)

> .....it would be nice to know if we've gone wrong somewhere and how to change it cos obviously he does a lot of sport and I think we are doing everything we can, and then he is still putting weight on (parent 10 – child obese/overweight).

But clearly PCTs seemed not to provide this sort of help that parents/guardians so desperately needed. The fact that the aspirations of the parents/guardians to receive some form of treatment are not met simply adds to the frustrations of the families. Of note, this is not the first time this is reported. Shucksmith *et al* (2009) in their pilot study identified that the measurement programme left unfulfilled anticipation of treatment amongst parents/guardians for those whose children were obese. Although it is arguable that it is not the aim of the programme to provide treatment or weight related interventions, it is clear that the principles of 'doing no harm' are defeated by identifying people having a problem and then leaving them to their own devices to sort it out themselves. Thus from an ethical point of view it would be absolutely necessary to tailor proper interventions on the back of such surveillance and screening programmes.

6.7.2 Finding help within the health system post weight feedback reception

The current study has clearly identified that a lot of families do not understand the entire system and how it works; a lot of families do not know who they can contact for help when it comes to weight issues of their children. Most parents/guardians felt that the system is too complicated, non-transparent and that the whole process of acquiring help from the system is too complex. Most parents/guardians got confused about where to go for help and who to contact. In the absence of a formal source of support, parents/guardians relied on one another for information about where to get help or which services to take their children to. A parent said:

> .....I think you are just left to your own devices. I think you are left to do it yourself really, aren't you? I asked one of the parents who got on the phone and she said they would send their son to Wickham Forest to do some more exercise and things, to bike ride and things. That may be an option to try and get on something like that for my son as well. Are you running a scheme like that? (parent 02 – child obese/overweight).

Parents/guardians wanted to know whether Teesside University was running any schemes for children with weight problems in the North East of England. This identifies how scarce the choices are for parents/guardians. But if the choices are available, then these findings confirm that awareness of these choices among parents/guardians is quite significantly limited.

Putting the issue of availability of services and awareness among parents/guardians aside, the current study identified some other intrinsic factors that hindered parents/guardians of children with weight problems from seeking support from services. The first and most important was fear of judgement. Most

parents/guardians felt that they would not consider consulting GPs and nurses about their child's weight status because they feared being judged as bad parents/guardians. Parents/guardians also thought that consulting GPs and other health practitioners about their child's weight status would indicate a weakness on their side as parents/guardians; therefore they took it upon themselves to try and fix the problems without consulting anyone. A parent reported:

> .....I think a lot of parents may be wary about contacting health professionals because it is another way they are being judged as parents if they are not parenting properly or, if their child is overweight, are they doing something wrong? I probably wouldn't go to the GP to ask for help. With issues like weight I would just generally try and sort of do it myself (parent 01 – child obese/overweight).

In addition to these intrinsic factors, the study also uncovered a number of external factors that could also impinge on awareness about the measurement programme. The most frequently voiced factor was the long wait for the feedback that families went through. After the school nurse had measured the children, it took almost six months for the weight feedback to get home. Most parents/guardians reported completely forgetting about the measurement process with the result that, when the feedback came home, parents/guardians could not figure out what it was referring to. This increased the complexity of finding help within the system, especially for those who had turned out to have weight problems. On this a parent reflected:

> ….. I thought it was quite a long wait and in a way I had sort of forgotten that she had all this done at school. It would have been nice to just maybe give me my feedback sooner, rather than right at the end of term when sort of everybody was slowing down and breaking up. But yeah, I do think it was quite a wait in between (parent 14 - child of ideal weight).

This long wait did not only affect parents'/guardians' awareness of the measurement programme, it also affected the children's awareness. Most children reported having forgotten about the measurement process by the time the weight feedback arrived home. A child said:

> .....I just got on with my life, I wasn't thinking about my weight and stuff. Somehow I forgot all about the measurements (child 14).

It is however important to note that this sort of attitude was more pronounced among children who felt they were normal weight. However children who perceived themselves as being overweight/obese or underweight were anxiously waiting for the weight feedback. These children reported often thinking about the weight feedback and wondering why it was not coming back. An overweight child reported:

> .....I always felt oh! When am I gonna get this letter to see what height and weight I am and I was just quite nerve racked (child 05).

In contrast with these findings, a study conducted by Mooney *et al* (2010) identified that half of the parents who planned to seek help planned to contact GPs. However Mooney *et al* (2010) do not indicate whether these were parents of children indicated to have weight problems. The findings of the current study clearly indicate that parents of children indicated to have weight problems do not wish to contact GPs and nurses regarding their child's weight status.

Of particular importance, proper knowledge of the system and how help can be accessed within the system could be achieved by enhancing awareness among families and this could subsequently lead to behavioural change. The next section therefore explores this in detail but first Box 6.4 summarises the key findings in the major theme – accessing help within the health system subsequent to weight feedback from the measurement process.

Box 6.4 Summary of key findings in the major theme – accessing help within the health system subsequent to weight feedback from the measurement process

- There is a lack of knowledge and understanding about the NCMP among parents/guardians and children in the North East of England.
  - Parents/guardians did not know what the purpose of the programme was, who was responsible for it and how it was being conducted.
  - Children also demonstrated considerable lack of knowledge about the purpose of the programme and who was responsible for it.
- Parents/guardians especially those whose children had weight problems anticipated receiving some form of treatment, support or help from the NCMP.
  - They thought there would be some form of intervention for their children.
  - However it was clear PCTs either did not provide this sort of help that these parents/guardians so desperately needed; or if there were any interventions on offer, parents didn't know about them.
- Parents/guardians found it difficult to know who they could contact for help; they also felt that the system was too complicated, non-transparent and complex.
- Most parents/guardians felt that they would not consider consulting GPs and nurses about their child's weight status because:
  - They feared being judged as bad parents/guardians.
  - They also felt that consulting GPs and other health practitioners about their child's weight status would indicate a weakness on their side as parents/guardians.
- Parents/guardians in the current study supported the idea of targeting children in school. Parents/guardians reiterated the fact that they wanted people to speak to their children in school about weight related issues.

6.8 Enhancing awareness about weight problems for behavioral change

> ..... I don't know I just think it is one of those things that I do think I know how to maintain a healthy weight. I do know what I should be eating and what children should be eating. It's just a case of getting the balance right and doing it and I think the information that the GPs would probably give many would be what I already know and my heart hurts now. It's just actually carrying it out.... (parent 09 – child obese/overweight).

Enhancing awareness of the weight problems for behaviour change was one of the themes which came out of the interviews conducted with parents/guardians and children in the current study.

6.8.1 Enhancing awareness about child weight problems

Although the impact of the measurement process on the mental wellbeing of children has been fully discussed in the next section (6.9), it is worth noting here that the role of such surveillance and monitoring programmes in over-sensitising children about weight issues cannot be underestimated. But a dilemma arises: on one hand families need to be made aware about weight issues so that they can support government interventions to combat childhood obesity; yet on the other hand children should not be given too much information about weight issues as it can potentially over sensitise them. This raises serious questions such as: how much information is regarded as too much? How best should health promotion relating to child weight issues be delivered? Who should be the main target? Where should the interventions be conducted? These and many other questions would need more robust studies to be conducted in order to be empirically answered. Some researchers and commentators however have suggested that such surveillance and monitoring programmes like the NCMP should be built into the broader school curriculum. In particular this programme should be situated in a broader theme of healthy lifestyles as part of the main school curriculum. This would enable follow up of those children deemed to have weight issues collectively rather than individually. Parents/guardians in the current study seemed to support the idea of targeting children in school to provide them with all the information they need about weight issues. One parent on this said:

> .....I suppose the main question is, is it right to measure children and if you say yes then where is the best place to do it? If you take it to the GP you risk medicalising it. If you do it in school as part of the curriculum, you know if everybody is doing it then they are not really being sort of singled out if you like, and if you get somebody to come to their house then that is gonna be too expensive. So it's probably the best of the options available.....it's better to do it in the school (parent 03 - child of ideal weight).

Moreover most parents/guardians reported allowing their children to take part in the measurement process just because everyone else was doing it. Not only parents/guardians, but also children reported wanting to take part in the measurement process because everyone else was doing it. A child noted:

> .....I wanted to take part because all the other children were taking part. A lot of pupils were talking about it and were like they were like excited and stuff, to get to know how tall they are gonna be and who is gonna be the tallest (child 17).

Additionally, parents/guardians reiterated the fact that they wanted people to speak to their children in school about weight-related issues as long as it was done sensitively to avoid stigmatising those children with weight problems. On this a parent said:

> …… I would love people to speak to the children at school about weight-related issues as long as it is dealt with sensibly so it is not drummed into them that you have to be a certain weight they have to be the normal or like the average, sometimes you are above average or below average and that is alright but it's just you have to maintain a healthy lifestyle and I think that is what should be stressed, not the figures saying if you are above this number you are wrong or if you are below this number you are wrong (parent 01 – child obese/overweight).

It is quite plausible to argue that integrating the measurement programme into the broader school curriculum could produce better positive health outcomes. Thus in terms of breaking the anxiety that comes with weight issues, the whole measurement process could be situated within a bigger school curriculum where the health authorities would deliver a module with teachers to the children during which children would get to weigh themselves, compare their weights and heights if they like, and situate this within a broader perspective of healthy lifestyles. In this way it would be something children and their parents/guardians are familiar with and parents/guardians are more likely to respond well to the feedback that comes from these objective measures rather than just doing it like a screening programme as is the current practice. This is a good example of using universal approaches for interventions to combat childhood obesity.

There are ongoing debates about whether interventions to prevent childhood obesity should be universal or targeted towards only the obese children (Lissau *et al.,* 2002). Power *et al* (1997) strongly supported the use of universal approaches for preventing childhood obesity based on the fact that obesity begins early in life.

However, there are no methods by which children at risk of obesity can be identified with precision. This means that by targeting only the obese children, a large proportion of children at risk of obesity who are often missed by the available tests would be left to develop obesity in adulthood. Thus it is preferable to target the whole population in childhood obesity prevention programmes. By suggesting a broader approach, i.e. integrating the NCMP into the school curriculum, the current study seems to support the use of universal interventions rather than the targeted ones. Moreover studies have indicated that the school is an important target of any obesity prevention programme because within schools people of all backgrounds can be accessed and the healthy lifestyles promoting programmes can be embedded with the school curriculum, thus increasing the response rates. Education in schools thus could provide knowledge to the children about the right choices for healthy lifestyles as well as learning to withstand media pressures advertising junk foods (Lissau *et al.,* 2002).

6.8.2 Behavioural change and readiness to change

Interviews in the current study clearly identified conformity of the participants to the transtheoretical model of behavioural change developed by Prochaska and DiClemente (1986) described in Chapter two, while highlighting the importance for readiness to change in any intervention. The process of change is observable; many parents/guardians cited examples of families in their neighbourhoods that were still at the precontemplation stage suggesting that no matter what they are told, they are not about to change any of their behaviours. For instance one parent said:

> .....I think some parents it doesn't matter what you send out to them or what you say to them it won't change their attitude at all. There are a lot of parents that won't change, it doesn't matter what you say they don't think that they are doing anything wrong or they don't actually take issues like that seriously (parent 07 - child of ideal weight).

The most plausible explanation is that they have not reached a point where they are ready to change and according to the transtheoretical model of behavioural change, that is a normal occurrence. But as the saying goes 'it's the constant drip that wears away the stone'. In terms of interventions focusing on changing people's behaviour, this would literally mean that messages persistently supplied to people can eventually get them to a point where they are ready to change. An individual could be told many times that healthy lifestyles are important, to no avail. But something might happen that makes him/her suddenly realise that it is high time she/he changed and adopted a healthy lifestyle. According to the transtheoretical behavioural change model, this is when individuals enter into the contemplation

stage to start thinking of changing their behaviours. In terms of health promotion and developing interventions it is important to identify this point when the 'penny drops', for people to realise that they need to change their behaviour. This is the point at which people are in the state of readiness to change. For the interventions geared towards adopting healthy lifestyles the key question to address is – what factors induce people into the state of readiness to change their behaviour towards adopting healthy lifestyles? The interviews in the current study identified the weight feedback letter as one of those factors that can potentially induce families into the state of readiness to change their behaviour towards adopting healthy lifestyles. Many parents/guardians reported thinking of adopting lifestyles after receiving the weight feedback letter. This happened across all the families irrespective of the weight category in which the child had been placed. But this came at different times depending on the weight category in which the child had been placed. Most of the parents/guardians narrated their observations of change, especially among their children after receiving the weight feedback letter. A parent whose child was indicated to have weight problems said:

> ....yes I have noticed changes especially when we got the letter telling him his height and weight and then what it said at the end cos I mean it said if he continues gaining weight to that effect he could end up getting things like cancer, well that is what it had on the letter. So since that he has been watching what he eats and he has been going, do you think I am losing weight and things. We haven't got scales in here but we have at my mum's at his granny's so he will go there and I know he has been using them there and I know he is there trying to say no with different options rather than just going for pizza, chocolate and things (parent 02 – child obese/overweight).

A parent whose child was not indicated to have weight problems also noted some behavioural change in his daughter after receiving the weight feedback letter and this is what he said:

> .....I tell you what she did say, well this sounds as terrible as what! We were getting her ready meals every now and again and she wasn't eating so often the fruit and vege as well she's got a very strong taste for sweet things.....We used to have a vege box delivered for our meal so she said I wanna start eating what you usually eat.....So I've been getting her the same sort of things but I have been cooking fresher stuff for her..... I think we are now more sort of aware of health stuff (parent 03 - child of ideal weight).

This parent cited a classic example illustrating the potential impact readiness to change can have on interventions geared towards changing behaviours to encourage healthy lifestyles. He talked of a TV programme by Jamie Oliver which led to changes in school dinners towards healthier choices. But then some

parents/guardians shunned this initiative and pushed chip butties through the railings for their children to eat. This is what he said:

> .....in terms of readiness to change an example is the Jamie Oliver thing which happened up here in Easington. And you have these bloody stupid women who were stuffing chip butties through the railings. What is all that about? Easington as well is one of the most deprived areas in the North East with worse chronic diseases in the North East and what they are doing is not having good outcomes (parent 03 - child of ideal weight).

This example highlights other factors that can affect readiness to change among many societies. For instance many families in areas of deprivation would seem to find it difficult to get to the point of readiness to change. Of course deprivation is linked to many other factors such as low levels of education and it is difficult to identify whether it is deprivation itself that delays readiness to change or it is the other associated factors such as low education. This important aspect would need more robust studies to be conducted. But perhaps the most common factors elicited from many parents/guardians acting as impediments in a change to their lifestyles were external and many of these have been discussed under the heading of obesogenic environment. Prime among these was the busy lifestyle that many parents/guardians have. Some parents/guardians identified that even though they realised that they needed to feed their children healthily, they could not avoid giving them ready meals in order to minimise the time spent preparing meals due to their busy lifestyles. On this a parent noted:

> ….I don't find it easy. Like I said…. busy lifestyles. My husband has got his own business - he is working a long day. I work full time. Yes, it's hard.....it's hard to prepare a healthy meal on the table as.....it is too easy to say, 'Oh we'll just have pizza. I know I am to blame for sort of my weaknesses as well, but it is hard to be strong and say no....I know what I should be doing but it's just, it is not as easy to do it (parent 01 – child obese/overweight).

Although parents/guardians agreed that changing lifestyles is not very easy, they indicated that the weight feedback letter could be very important in getting parents/guardians to realise that something needs to be done to adopt healthier lifestyles. Some parents/guardians/guardians regarded it as an 'alarm bell', while others termed it a 'wake up call'. However they reiterated the need to provide more information, perhaps in the form of follow up information packs identifying the various options from which children and parents can choose to ensure that they successfully change their behaviours towards adopting healthier lifestyles. On this a parent said:

> ..... I think, if you give parents information on sort of healthy eating like.....the booklets that have gone round recently it does make you think.....oh well may be I could do this or maybe we could go out and have a run every weekend and do this and that. So yeah I think maybe with that feedback, a bit of information or a bit of sort of support as in healthy foods or information on exercising or even information on things in the area that you could use like sort of sporting venues in the areas that your children could go.....(parent 09 – child obese/overweight).

But in doing this it is important to recognise the right timing when such information should be sent to the parents/guardians to avoid wastage of resources when materials are just put in the bin. Some parents/guardians suggested more radical measures such as the government introducing taxes on shops selling fast food and banning TV advertisements for junk foods that target children. They also mentioned about introducing safe cycling paths and safe walking routes through which children could commute to schools. Parents/guardians repeatedly indicated their willingness to support these initiatives if they were to be put in place. However, few of them had any idea what they planned on doing next personally to ensure that their children attain and/or maintain a healthy weight.

The current study has been able to show that behavioural changes involving encouraging families to adopt healthy lifestyles cannot be delivered single handedly; but require a multidimensional approach that brings together all stakeholders working together to achieve a common goal, and that is to ensure promotion and/or maintenance of healthier lifestyles within the families. Above all there is a need to identify the right timing for interventions as well as identifying and promoting those factors that can potentially induce people into the state of readiness to change. That said, without understanding the impact of interventions like the NCMP on the mental wellbeing of children, it would be difficult to achieve meaningful behavioural change without causing harm in one way or another. The next section discusses findings on the impact of the measurement process on the mental wellbeing of children. Box 6.5 summarises the key findings under the theme – enhancing awareness for behavioural change.

Box 6.5 Summary of Key findings under the theme – enhancing awareness for behavioural change

- The current study identified the weight feedback letter as one of those factors that can potentially induce families into a state of readiness to change their behaviour towards adopting healthy lifestyles.
- Readiness to change can have a potential impact on interventions geared towards changing behaviours to encourage healthy lifestyles.
- Factors such as deprivation can also impact on behavioural change.
- The most common factors that were echoed by many parents/guardians impeding them from considering changing their lifestyles were external and they included busy lifestyles of parents/guardians etc.
- Parents/guardians reiterated the need to provide more information e.g. in the form of follow up information packs identifying various options from which they can choose to ensure that they successfully change their behaviours towards adopting healthier lifestyles.

6.9 Impact of the measurement process on the mental wellbeing of children

> ..... I get called names at school for being really skinny and I really don't like it. I sometimes feel depressed, I feel very angry and I wanna get them back but I can't get them back because they will all turn against me. I hoped that I can show them the results of the measurement so that they can know I am normal (child 04 – underweight child).

One-to-one semi-structured interviews conducted with children revealed intriguing findings regarding the feelings, reactions and perceptions children hold towards the NCMP.

6.9.1 Taking part in the NCMP – the perspective of children

At first sight, children are quite happy to take part in the measurement process. However digging deep into this phenomenon reveals different reasons for this happiness about the programme. Many children, especially those with normal weight feel happy when they first learn that they are to be measured and weighed because they are curious to know their height and weight. One child with a normal weight reported:

> .....I think I was just curious to see my weight and height (child 03).

This enthusiasm is usually exacerbated by the fact that everyone else is taking part in the measurement process. To these children the whole exercise is exiting, it is fun and they would like to see who is taller than the other. This happiness is often something that their parents/guardians as well spot. For instance the parent of child 03 reported:

> .....she was quite happy cos it wasn't something that she didn't want to do; no, she was fine with it (parent 03 - child of ideal weight).

This sort of reaction is typical of children who perceive themselves to be of ideal weight so it is particularly dependent on perceived weight status as a lot of literature shows that children normally do not know their actual weight status (Jones *et al.,* 2011; Mooney *et al.,* 2010).

However for children with weight problems, the experience is different. Some children who perceive themselves as being overweight live in denial of their own weight status. At one moment they feel overweight and at another moment they don't really accept that they are overweight. These children see the NCMP as a source that will finally tell them the truth about their weight status. For instance one child who perceived himself to be overweight said:

> .....I think I am actually getting quite confused, sometimes I am like, oh yeah I am actually overweight and then sometimes I am like, no I am not, I can't be (child 05).

Even though children are quite happy to take part in the NCMP, the moments before being measured are characterised with mixed feelings depending on the backgrounds of the children. Many children feel anxious, nervous, and worried, yet with no clear understanding of what happens during the actual measurement. Children rely on each other for information on what is about to happen to them. They ask each other questions about what goes on in the room where actual measurement is taking place. For example a child said:

> .....children were asking me how it was and I said it was ok, children were anxious thinking it was a terrible thing. You could look at the face of the next person and you could see he was absolutely terrified (child 10).

It is clear that many children, after realising how simple the measurement of their height and weight is, start to question why they worried before. This poor level of information could be one of the reasons why some children opt out of such a programme. One child reported:

> At first I felt a bit uncomfortable, I was really worried and I didn't want to be measured and weighed, but when I saw my friends going in I thought it was okay. After being measured I thought it was quite funny because I had been worrying about it and I didn't know that there was nothing to worry about, so I started laughing (child 18).

However this does not happen to all children; for some children whose parents/guardians routinely weigh and measure them at home, there is no pressure at all. They have neither worry nor anxiety when they are about to be measured; they see this whole process as something normal. A child noted:

> .....I wasn't worried or anything because I have been measured and weighed before by my mum and grandma so it was practically just the same (child 12).

This underscores the importance of raising awareness about issues of weight status among families. This was one of the reasons why the Department of Health in the UK recommended that PCTs should consider routinely feeding back the results of the NCMP exercise to the parents/guardians and children (Shucksmith *et al.,* 2009). However what the Department of Health overlooked in making this decision was the impact the entire process could have on the mental wellbeing of children and their families. Yet this has remained a gap in knowledge as no studies have been identified that explored this important aspect directly.

It is therefore of particular importance to explore what happens to children through the entire process. Reactions of children before being measured have already been presented above, yet of most importance is what happens to children after they have been measured. Different things happen in the lives of children after being measured but perhaps the most conspicuous is the increase in the curiosity of children about their weight and height. Most children reported that months after they had been weighed and measured by the nurse their interest in their weight increased. Some children even urged their parents/guardians to buy scales for them so that they can monitor their weight.

> .....I wasn't really bothered if like I knew the weight or not but now I sort of want to know all the time, I do stand on the weighing scale more often than I used to do before (child 20).

For some children this change in behaviour was clearly out of curiosity; after all they had discovered something new about weighing scales. Consequently children who just used to look at scales and ignore them before had then learnt their role and wanted to explore how they work.

> .....I had never really gone on it before and I wanted to see how it really works, I never knew how it works. After the school nurse weighed us, I have been going on the scale every now and again (child 15).

This sort of behavioural change was conspicuous among children of all weight status categories, however it was more pronounced among those children who perceived themselves to have weight problems. Consequently even before the weight feedback could be sent home, children were already changing their attitudes about their weight status. One child who perceived herself to be underweight reported:

> .....I felt down because of my weight, I thought I was really skinny, so day after day I would step on the scale to see if anything has changed (child 04).

Some parents/guardians also reported observing this change in behaviour of their children although many were reluctant to link it to the measurement process their children had undergone. They suggested that this change could have been due to some other reasons mainly their age, given that many children were starting puberty. However they also expressed scepticism about the measurement programme in this respect, pointing out that it could easily influence children at this age into becoming obsessed with monitoring their weight which could have a negative impact. A parent explained:

> .....I would just be a bit concerned that for the age range that DJ is, she is becoming very self-conscious, very conscious about the way she looks and her image and that's when I think children can be influenced by things like that. You find that she now likes to go on the scales more often (parent 01 – child obese/overweight).

These findings could indicate that the role of the NCMP in potentially increasing awareness regarding weight issues among children cannot be underestimated. But whether this change in awareness is good or bad is an issue that has sparked debate among researchers, health professionals, politicians and commentators. However from the government's point of view, awareness is necessary in order to enable individuals to support interventions aimed to combat childhood obesity (Cross-Government Obesity Unit, 2009).

For some children this curiosity of getting on the scales soon fades away with time. However for others it gets mixed with the anxiety brought about by the long wait for the feedback showing their height and weight. Many children feel frustrated when they don't receive their height and weight feedback in the weeks after being

measured and weighed. This is more pronounced among children who perceive themselves to have weight problems. A child reported:

> .....I just felt oh, when am I gonna get this letter to see what height and weight I am and I was just quite nerve rackened (child 11).

But also parents/guardians were able to spot this frustration among children who actually appeared to be overweight. One parent observed:

> .....If you see them they look pretty worried about it really you know inherently they are thinking they are bigger than others and may be the results will not come back the way I wanted them to come back.... (parent 14 - child of ideal weight).

Literature does not provide evidence about the possible impact of long waits for weight feedback on children's wellbeing; however the current study has been able to identify some issues such as frustration, worry and anxiety among children, especially those who perceive themselves to have weight problems, when the weight feedback takes a long time to come back.

One of the key aims of the current study was to identify what parents/guardians and their children do when they receive weight feedback. Parents'/guardians' reactions to the weight feedback have already been exhaustively discussed in the previous sections but how children (especially those with weight problems) react to the news of their weight status still remains a subject for speculation. This is because most parents/guardians whose children were labelled overweight/obese decided not to show this kind of feedback to the children. During the interviews most children reported that they had never received the weight feedback letter through the post. However interviews with their parents/guardians showed that the initial shock parents/guardians experienced hindered them from showing the children the weight feedback letters for fear of scaring them or even their children getting obsessed with their weight at such a tender age. That said, there were some parents/guardians who chose instead to sit their child down and told them of the news of their weight status and the discussion below is based on the experiences of these children.

6.9.2 Receiving weight feedback – what children go through

When the letter showing weight feedback finally arrives home, there are different reactions children have towards the news of their weight status. Feelings of shock are evident among children who are told that they are overweight when in fact they thought they had a normal weight. One child narrated:

> .....I was just seated watching tele then and my dad said, 'Come here please'. He said, 'You are overweight somehow'. And I am like, 'No! You are joking. No!' I looked at the letter and it said that. I looked quite surprised (child 05).

Although it was quite possible to work out the process that parents/guardians go through after the initial shock of their child's weight status to the time they finally accept it, it was not quite easy to discern this for children, due to the limited nature of information that children give. However it was evident that such children for some time live in denial of their weight status. One moment they think it is true they are overweight and at another moment they think that something must have gone wrong and they have not been properly diagnosed. They even feel they would like to be weighed and measured again, just in case the school nurse got it wrong. To these children, the measurement process should be done routinely to enhance proper monitoring of the changes in weight status while maintaining accuracy of the diagnosis. For instance one boy said:

> ..... I would like to see them take my weight again because I am just not sure they have got that one right. I would say children should be weighed once every month. Like if you are getting overweight they would be able to know and tell you (child 05).

Undoubtedly the weight feedback letter seemed to impact on the mental wellbeing of children who were indicated to have weight problems, especially those who did not think that they had weight problems. Changes in relationships among their peers stood out. Some children reported identifying themselves with new friendships with children in the same weight category. For instance a boy who had been told that he is overweight said:

> ....I now have a new friend called BT whose letter also said that he was overweight. My brother thinks he is tiny, but yeah, my dad thinks he is overweight. We sometimes talk about it with him (child 09).

Other than changing relationships, children reported that it plays on their minds a lot of time causing them to get worried. Exploring the cause of this worry indicated that children feel they have limited information about what they can do about their situation. A lot of children reported relying on their parents/guardians for information about what can be done. On this, child 08 said:

> .....I sometimes think about it a lot. Yeah I keep on thinking like when I am by myself I just think I am like, oh yeah I am overweight. I am worried because I don't know what to do about it. But my mum said I need to do more exercise, especially out of the house (child 08).

This lack of knowledge has also been reported in a recent systematic review on the views of young children about weight status (Rees *et al.,* 2011). The impact of the feedback letter on the mental wellbeing of children who had been indicated to have a problem was so obvious that even parents/guardians were able to spot it. Many parents/guardians especially those who had sat their child down and told them of the news of their weight status reported seeing changes in the mood of their children and sometimes on the behaviour of their children. A parent reported:

> .....since the letter my son has been down and worried. We have just been trying to tell him not to worry about it, you know; not to think about it too much but just that really he couldn't believe how heavy he was. ....Oh yeah there have been some feelings of worry in the family (parent 08 – child obese/overweight).

Another parent noticed a change in the behaviour of her child after receiving the weight feedback letter and this is what she saw:

> Obviously he doesn't go on his computer or anything as much any more after the feedback was sent. Also when he goes to the fridge he likes to take the healthier option so he picks a fruit instead of a chocolate or something (parent 09 – child obese/overweight).

On the other hand children whose weight status came out to be normal received the news with a lot of joy and happiness. To some children especially those who normally perceived themselves as overweight or underweight it is a great relief. Such children say that the news makes them happy and they are finally able move on without worrying. For instance a child said:

> .....I was really happy that I wasn't overweight or underweight (child 13).

But this seemed not to happen to children only; many parents/guardians also reported feeling happy when the feedback letter for their children indicated that their children are of normal weight. Some parents/guardians went ahead to reward their children with incentives such as a pet, a party and many others. One child reported that her mother bought her a dog when the feedback letter came back indicating that she was of ideal weight. The child said:

> .....when the letter came my mum was very happy to see that I was normal and so she bought me a dog and I was like, I was very happy (child 19).

A number of other children reported parties being thrown at home because their weight status turned out to be ideal. While this would seem bizarre, it simply

emphasises the earlier point about the inability of parents/guardians to identify the true weight status of their children.

It should be noted that the current study identified several significant challenges faced by the measurement process which may hinder its potential to induce behavioural change among families. The next section presents findings on these challenges but first Box 6.6 presents the summary of the key findings under the theme – impact of the measurement process on the mental wellbeing of children.

Box 6.6 Summary of key findings under the theme – impact of the measurement process on the mental wellbeing of children

- At first sight, children are quite happy to take part in the measurement process
- Moments before being measured are characterised with mixed feelings depending on backgrounds of children:
  - Many children feel anxious, nervous, and worried, yet with no clear understanding of what happens during the actual measurement
  - For children whose parents/guardians routinely weigh and measure them at home, there is no pressure at all.
- Different things happen in the lives of children after being measured but perhaps the most conspicuous is the increase in the curiosity of children about their weight and height.
- The long wait for feedback caused frustration, worry and anxiety among children, especially those who perceived themselves to have weight problems.
- When weight feedback arrives home, feelings of shock are evident among children who are told that they are overweight when in fact they thought they had an ideal weight.
- The weight feedback letter seemed to impact on the mental wellbeing of children who were indicated to have weight problems, especially those who did not think that they had weight problems.
  - Changes in relationships with their peers stood out.
  - Children also reported that it plays on their minds a lot of time causing them to get worried.
- Children whose weight status came out to be ideal received the news with a lot of joy and happiness.

6.10 Challenges of the measurement programme

> .....like I said, some of her friends have come to her and said, 'I am fat and I need to lose weight and I need to go on a diet', and I've just said, 'Oh don't be daft! As long as you are healthy and as long as you eat the right things that's all you need to do.' And that's my sort of plea on it, but I know a lot of her friends are very conscious about their weight now (parent 01 – child obese/overweight).

Interviews conducted in the current study identified challenges faced by the measurement process as another key theme. These challenges range from over-sensitising children about weight issues to the ambiguity of using the BMI method to assess and report weight status to parents. These aspects are discussed in the sub-sections that follow.

6.10.1 Over-sensitising children about weight issues

Debates have gone on regarding the notion of over-sensitising versus raising awareness about weight issues among children. Advocates for weight screening and surveillance programmes among children especially in schools emphasise raising awareness about weight issues among children and their families in order that they can support interventions aimed at combating weight problems. However critics of the weight screening and surveillance programmes among children view these efforts as unnecessarily over-sensitising children about weight issues, which could potentially have negative impacts. The current study identified that raising awareness about weight issues among children and their families through surveillance programmes at school was necessary and it was viewed as a good idea among parents/guardians. For instance a parent noted:

> … yeah I think it is a good idea. I do think it is very good to make children aware of sort of the issues around weight, and things like that make them aware very early on and then it means they can sort of keep up a healthy lifestyle (parent 08 – child obese/overweight).

However parents/guardians also feared that when the information aimed at raising awareness is not put across correctly, it can have the negative impact of making children over-sensitised about weight issues, as parent 11 noted below:

> .....I do think there were down sides as in if it is not put across in the right way, it could have the adverse effect and it could turn the likes of especially young girls the opposite way if they think they are overweight at this kind of age they are 11, 12 years old, they could then sort of change the eating habits and become sort of very unhealthy, instead of it being a positive effect.... (parent 11 – child obese/overweight).

Among other things parents/guardians feared the potential surveillance and screening programmes such as the NCMP could have on the attitudes of their children towards food. Most parents/guardians viewed their child's relationships and attitudes towards food as being positive but they expressed concern that the measurement programme, especially the way the feedback was written, could potentially change their child's attitudes. They explicitly expressed that they didn't want their children to become obsessed with weight issues. But also they didn't want their children at that tender age to become obsessed with what they are putting into their mouths.

> .....my daughter has a very healthy attitude towards food and, like I said, she stops eating when she has had enough. She is very conscious of having her five a day, fruit and vege. She is not a great one for sweets and treats and things like that, and I am very, very proud of sort of her attitude towards food and exercise and her quite healthy lifestyle. And when we got the letter, me and my husband looked at it and thought, well we cannot show this to her because we don't want it to affect her eating and her lifestyle as it is now…(parent 01 – child obese/overweight).

It was quite clear that parents/guardians did not want to make an issue of the weight status of their children. Some parents/guardians cited reasons that weight had been made an issue to them while they were younger and this has impacted on them throughout their life, an awful thing they did not wish their children to go through.

> .....as I said with DJ, at the moment she is sort of not just the right weight but she has a healthy attitude towards it. It is not an issue and I don't ever want it to be an issue because I know I have always been conscious about my weight because it was made an issue when I was younger (parent 01 – child obese/overweight).

But consensus about the right time for raising awareness among children is far from being reached. Some parents/guardians thought that the best age for raising awareness among children should be 10-11 years when most of them are entering puberty. These parents/guardians also thought that the measurement programme targeting children at year six (10-11 years) was therefore timely identified. They argued that this age represents a transition when children are coming out of full control of their parents/guardians and moving towards independence. It is therefore better for children as they become independent to have accurate information about maintaining a healthy lifestyle. On this a parent noted:

> .....I think the programme raises the awareness at a critical age when children are starting puberty..... (parent 06 - child of ideal weight).

Some other parents/guardians did not think that year six (10-11 years) was the right age for raising awareness about weight issues. They argued that children at this age were too young to be made aware of weight issues given its sensitivity. They therefore held the view that programmes such as the NCMP only serve to over-sensitise children about weight issues while doing very little to fix the worry and fear that comes with it.

But the key question to address here is whether there is enough evidence to think that measurement programmes over-sensitise children. In the current study, children of all weight status categories reported that participating in the NCMP increased their curiosity and frequency of stepping on the weighing scales at home to monitor their weight. One child said:

> .....since then I have been going on the scales to try and monitor my weight (child 17).

But perhaps of more significance, children's accounts indicate that most children whose weight feedback letter identified them to have weight problems have been worried, scared and feel overly sensitised about their weight status to the extent that every time they are by themselves they can't help thinking about their weight status and worrying about it. For instance a child said:

> .....when I am by myself I keep on thinking about my weight status. I can't believe I am overweight (child 09).

Parents/guardians of children indicated to have weight problems have been able to spot changes in behaviours of such children, which could suggest that they have been over-sensitised about weight issues and it may be they are becoming obsessed with it. A mother of an overweight boy said:

> .....I have noticed changes especially when we got the letter telling him his height and weight and then what it said at the end because I mean it said if he continues gaining weight to that effect he could end up getting things like cancer, so since that he has been watching what he eats and he has been going, **do you think I am losing weight** and things? (parent 02 – child obese/overweight).

But many researchers and commentators have asked whether or not the principle of 'doing no harm' is breached when screening is not matched by appropriate care pathways or interventions for those deemed to have a problem (Westwood *et al.,* 2007). Although some earlier studies identified that parents/guardians would like to

receive the height and weight measurements of their children from school based measurement programmes (Boozman, 2008; Grimmett *et al.,* 2008; Mooney *et al.,* 2010; Nihiser *et al*., 2007). These studies did not look at the potential negative impact such programmes could have especially one of over-sensitising children about weight issues. The current study has been able to shed some light on the potential of the measurement programmes particularly the weight feedback to over-sensitise children about weight issues which could lead to dysfunctional relationships with food and exercise, together with making children obsessed with weight.

Worse still most school-based measurement programmes use BMI as the tool to identify those children with weight problems. Although contentious, BMI has been shown to be a poor measure of weight status among children. This simply means that a lot of children who are misclassified by BMI may be made to worry and get over-sensitised about having weight problems for nothing. The next section discusses the use of BMI as an indicator for weight status among children.

6.10.2 Using BMI as a measure for weight status among children

> .....the letter indicated the BMI, I haven't got a clue about anything like that. I couldn't tell you what it is or at least what the right BMI should be. I just haven't got a clue at all (parent 13 - child of ideal weight).

BMI is the most widely used method of estimating weight status. However this measure has been criticised widely by many researchers and commentators. But the extent to which parents/guardians and their children perceive and understand BMI as the measure of weight status is a very important issue that had never received attention among researchers. The current study has been able to explore this important aspect. Interviews from the current study have indicated that parents/guardians did not understand about BMI and what it is supposed to do or how it is supposed to be interpreted. But this important term appeared on the feedback letters as the indicator of weight status without the initials explained. It was clear that many parents/guardians got troubled because they could not understand what BMI stands for and what it is in essence. This only served to add to the ambiguity of the feedback letter creating more annoyance and panic. A parent spoke of the lack of clarity about how the BMI was obtained from the measurements of height and weight. He said:

> .....the feedback letter clearly identified what was measured that's obviously height and weight, but it did not clearly indicate the way of getting the BMI. It also had on the centiles in terms of sort of what was classed as normal

> and what was classed as abnormal if you like (parent 03 - child of ideal weight).

This lack of clarity would only increase the ambiguity of the feedback letter and could potentially change the opinion of many families towards defiance rather than getting on board to support the interventions aimed at combating weight problems. Due to the sensitive nature of weight problems in contemporary society, it is important to get the communication to families absolutely right.

In addition, the fact that cut off points used to define weight status in surveillance and screening programmes are different from those used clinically to diagnose weight problems creates a lot of confusion. Parents/guardians rightly noted that it does not make sense to receive a feedback letter indicating that the child is overweight/obese if, when actually taking the child to the GP, he/she measures them and says they are perfectly normal. It does not only waste the time of parents/guardians it also makes the surveillance and screening programmes conducted in schools lose credibility. On this a parent noted:

> ....so as a parent if you took your child to the GP and say that this letter said my child is overweight and the GP weighs them and says, 'Oh no they are not, they are perfectly normal', then you just lose your faith in whoever did the weight measurements at school, don't you? (parent 01 – child obese/overweight).

The current study has shed some light on the potential for use of BMI to create confusion among parents/guardians, which could impact on their ability to support interventions aimed at combating weight issues among families. Box 6.7 summarises the key findings under the theme – challenges of the measurement process.

In a nutshell, despite the challenges mentioned above, it has been demonstrated in the interviews in the current study that the National Child Measurement Programme could be key in raising awareness about weight problems in many families. It should therefore be encouraged and supported. Consideration needs to be put on the way it is delivered to families, to reduce the possibility of negative outcomes, as much as possible. More on this has been discussed in the chapter that follows.

Box 6.7 Summary of key findings under the theme – challenges of the measurement programme

- Raising awareness about weight issues among children and their families through surveillance programmes at school is viewed by parents/guardians as a necessary and a good idea, however:
    - They note that when the information aimed at raising awareness is not put across correctly, it can have the negative impact of making children over-sensitised about weight issues.
    - They explicitly expressed that they didn't want their children to become obsessed with weight issues.
- Children's accounts indicate that most children whose weight feedback letter identified them to have weight problems have been worried, scared and feel overly sensitised about their weight status to the extent that:
    - Every time these children are by themselves they can't help thinking about their weight status and worrying about it.
    - Children try to keep monitoring their weight to see if it has changed
- Parents/guardians of children indicated to have weight problems have been able to spot some changes in behaviours of their children which could suggest that they have been over-sensitised about weight issues.
- Interviews have indicated that parents/guardians did not understand how BMI is supposed to be interpreted.
- Parents/guardians rightly noted that it does not make sense to receive a feedback letter indicating that the child is overweight/obese if this is then contradicted by the GP, using different cut off points to determine caseness.
- The study has pointed to the potential for use of BMI to create confusion among parents/guardians which could impact on their ability to support interventions aimed at combating weight issues among families.

Chapter 7 – DISCUSSION

7.1 Introduction

This section presents the discussion of the findings from the study. It integrates both quantitative and qualitative findings. Throughout the chapter key findings are summarised and interpreted in terms of their broader significance, whilst also relating them to the wider scientific literature available. The section sets the scene by discussing the association between weight status and mental wellbeing of children and the impact on the mental wellbeing of children and parents of participation in the NCMP. The section further addresses the important question of whether or not it is useful to routinely feed back child weight status; exploring the cycle of emotional reactions that families undergo when they receive child weight feedback. Later, the advantage of routine feedback in initiating behavioural change is explored, before providing suggestions of how best the routine feedback letter should be prepared. This chapter also discusses validity and reflexivity and ends with an outline of the possible limitations of the study.

7.2 Interpretation of the major findings of the study

The relationship between weight status and mental wellbeing of children, and the impact of monitoring and surveillance programme on this relationship are issues that have been debated for decades, yet not answered convincingly to date. The value of routine feedback of child weight status has been a matter for discussion among researchers, health professionals and policy makers over a long period, yet not resolved conclusively to date. The current study provides further empirical evidence to answer some of the questions raised in these debates; for some others it has provided information which could be used as a spring board from which further research work could be designed to help find convincing, empirically supported answers. To begin with, it was felt critical to obtain a clear understanding of the association that exists between weight status and mental wellbeing of children. The available evidence has been equivocal in explaining this relationship. An insight into this aspect is provided in the sub-section that follows.

7.2.1 Relationship between weight status and mental wellbeing in children

In the first place the observed prevalence of both weight problems and mental health problems among children was similar to that reported in national surveys (Ells

et al., 2010; Green *et al.,* 2005). Thus, although the survey work was undertaken with a relatively small local sample and one cannot make statistical inference to the population at large, one can, perhaps, infer that the child population under scrutiny was not so very different from that found elsewhere in the UK. Thus approximately 1 in 10 children had a potentially diagnosable mental condition (as measured on two separate scales and 1 in 5 children were overweight (with 1 in 10 children obese). However, this thesis set out to explore whether these two conditions were in any way linked.

In reviewing the literature, there were no previous studies obtained that directly investigated the association between mental wellbeing of children and weight status; however a few studies obtained had investigated the association between psychological problems and childhood obesity. A systematic review by Reilly *et al* (2003) identified that obese children had low self-esteem, were depressed, developed anxiety and many other psychological problems. Other studies demonstrated a significant association between high BMI and self-perceptions of social acceptance (McCullough *et al.,* 2009).

Literature has also indicated contradictory evidence regarding the association between psychological problems and childhood obesity. For instance, Klesges *et al* (1991) argued that no differences exist in self-esteem between younger obese children and their leaner counterparts. What could account for these very different findings? The current study provides some clues.

None of these earlier studies considered whether or not the children investigated had been told and/or knew that they are overweight or obese. It is thus not clear whether or not these children perceived themselves to be ideal weight, overweight or obese.

In the current study there were no significant associations discovered in children prior to the NCMP exercise between actual weight status and mental wellbeing using any of the indicators selected. The moment one replaces actual weight status with the child's perceived weight status, however, the whole picture changes. The evidence from the current study points to the fact that weight status problems only impact on the mental wellbeing of a child when he/she believes they are obese, overweight (or occasionally underweight). It would follow that higher BMI which is not perceived and/or acknowledged by the child as a problem is unlikely to affect the

mental wellbeing of that child, and that is indeed what this study discovered. It may thus indicate that any association between poorer mental wellbeing and obesity results from the stigmatisation that follows labelling.

Survey findings from this study also identified that children rarely knew their true weight status prior to the NCMP exercise. In fact most children misclassified their weight status. These findings were corroborated by the accounts of children and parents in the qualitative interviews. It was quite clear that most children and likewise their parents/guardians were taken by surprise when they learnt of the true weight status of children through the child weight feedback letter received from Gateshead PCT. This misperception has also recently been reported by other studies (Jones *et al.,* 2011; Mooney *et al.,* 2010). On one hand children with weight problems misperceive themselves to be of ideal weight, probably because of the general shift in the average weight status of children towards obesity and overweight over the past decades (Luttikhuis *et al.,* 2009). This means that children increasingly see their weight status as the ideal because everybody else around them is within a similar range. Consequently, it becomes increasingly difficult for parents and children to spot deviations that could potentially result in childhood obesity. On the other hand, some children misperceive themselves as having weight problems when actually they are of ideal weight. This could have its roots in the influence of the popular media portraying certain sizes as particularly attractive and successful. For instance magazines, TV shows, advertisements etc portray small sizes as the best – the 'size zero culture' (Hill, 2006). This influence could make children with ideal weight misperceive themselves as overweight or obese.

Undoubtedly, this misperception could have far reaching implications on the wellbeing of children. As already mentioned, Chi-square tests identified very strong evidence for a significant relationship between mental wellbeing and **perceived** weight status of the children. Children who perceived themselves to be overweight, obese and underweight were less likely to have total difficulties scores in the normal range. This association was also true for emotional problems, conduct problems, hyperactivity problems and peer problems. In addition, no evidence was found for the association between life satisfaction and actual weight status, whereas a strong association was found between life satisfaction and perceived weight status of children.

A number of reasons could explain why perceived or known overweight/obese weight status categories are associated with poor mental wellbeing among children. Overweight/obese weight categories carry stigmatising connotations. The derogatory attributes attached to overweight and obesity such as laziness, inability to control oneself and so on add to the psychological pressure that children perceiving themselves to be in these weight status categories would develop (Schwartz and Puhl, 2003).

The association between perceived weight status and poorer mental wellbeing has been shown in this study but the question of the direction of causation remains unclear. While evidence indicates that childhood obesity could impact on the mental wellbeing of children, some researchers have suggested the reverse, pointing out that it is instead poor mental wellbeing that may lead to weight problems since it affects normal patterns of eating and physical activity (Goodman and Whitaker, 2002). Generally, there hasn't been strong evidence for the causal link between child weight status and mental wellbeing; the few studies conducted (Klesges *et al.,* 1991; Pierce and Wardle, 1993; Stradmeijer *et al.,* 2000) have been limited by small sample size, thereby affecting the external validity of the results. The current study also did not aim to establish causality between child weight status and mental wellbeing but rather to describe the associations and relationships that exist between the two variables.

However, it is clear from the current study that a number of children (especially those who misperceive themselves to have weight problems) are likely to end up experiencing poor mental wellbeing, developing emotional problems, conduct problems and so on when they have no cause for anxiety. On the other hand, the phenomenon of children with weight problems misperceiving themselves to have normal weight is only likely to undermine efforts to support interventions aimed towards combating weight problems among children.

These findings are suggestive of the need for surveillance and monitoring programmes such as the NCMP, which weigh and measure children and feed back their true weight status. However, before recommending such a course of action, it is important to understand how the structure and handling of such activity could impact on the mental wellbeing of children and parents as the next section discusses.

7.2.2 Impact of the NCMP on the mental wellbeing of children and parents

The impact of the NCMP on the mental wellbeing of children is of particular importance; however, earlier studies did not place much emphasis on this aspect. For instance, Mooney *et al* (2010) did not directly investigate the reactions of children towards the feedback, as they only interviewed parents, PCT staff and school teachers. They suggested that parents reported that a substantial number of children ended up opening up the feedback letter rather than their parents. They argued that the fact of children seeing the NCMP letter was accidental and suggested sending the letter with terms like 'confidential' on top to avoid children seeing the content. However, it is argued here that the goal of the Department of Health in recommending routine feedback is to raise awareness about weight issues among parents and their **children**, a point reiterated by Shucksmith *et al* (2009). Such a claim that feedback to children is unimportant or that children should not be involved in or given information about their treatment runs counter to all current trends to recognise the competence of children and to address their rights to give assent and be consulted in such matters. This means that the NCMP feedback letter must be palatable to children as well. As such, the important thing is to identify what the impact of this feedback is on the mental wellbeing of children, which the Mooney *et al* (2010) study obviously did not do. The current study identified evidence of the likely impact of the NCMP on the mental wellbeing of children.

Children described being shocked, worried and anxious after receiving the weight feedback letter identifying them as overweight or obese. The qualitative interviews provided evidence that weight feedback seemed to impact on the mental wellbeing of children who were indicated to have weight problems when in fact they previously thought that they were of ideal weight. Children reported that since learning that they were overweight/obese, it played on their minds a lot of time causing them to get worried and to consider changing relationships with their peers in favour of those who were identified to be under the same category. Overall children's accounts indicated that most children felt overly sensitised about their weight status, however heavy they were.

Whether or not the NCMP increased awareness of child weight issues among parents/guardians was one of the things the current study wanted to uncover. One-to-one semi-structured interviews with parents/guardians indicated that most parents knew very little about the NCMP before receiving the weight feedback letter. There is no doubt that weight feedback increased parental awareness of child weight

issues. Boozman (2008) in a study undertaken in Arkansas identified similar findings. Phillips *et al* (2010) have recently argued that not only can this exercise increase parental awareness of weight issues, it could have the potential to bring about broader changes in lifestyles with respect to physical activity, nutrition and policies in the entire environment within which children live. Sahota *et al* (2001) demonstrated that school based intervention programmes for combating obesity could lead to positive changes at a school level.

These findings would seem to underscore the need to routinely feed back weight results to families in an attempt to bring to their attention the negative consequences of childhood obesity. But whether or not routinely feeding back child weight status results is an initiative that would be helpful is a question that has been debated for decades as the next section identifies.

7.2.3 Routine feedback of weight status to families of children

Researchers and commentators have disagreed over whether measuring children and feeding back the weight status to parents and children could provide the solution to problems of childhood obesity. However, due to the lack of robust empirical evidence, it has been difficult for any group to argue with certainty whether or not feeding back weight status results to parents and children would solve the dilemma. Findings from the current study have indicated that feeding back weight status of children to parents and children caused annoyance, panic and worry among parents whose children were indicated to have weight problems. However the study also provided evidence that this weight feedback could act as an important spur to parents and children to think of adopting healthy lifestyles. These findings are similar to those of earlier studies (Grimmet *et al.,* 2008; Nihiser *et al.,* 2007). However some of these studies were experimental rather than conducted in natural population settings, while others were conducted in the USA and thus present problems associated with cultural transmissibility. The current study therefore adds the advantages of being conducted in the natural setting of the NCMP in the UK.

Soon after receiving the news of the child weight status in the feedback letter, children (especially those who were indicated to have weight problems) reported wanting to do something about it. Likewise some parents/guardians described this letter as an ‘alarm bell’, while others called it a ‘wake up call’. Most families attested to the potential of the weight feedback letter to raise awareness about weight issues. What this study was unable to tell, within the time frame in which it was conducted, was whether these intentions were subsequently transformed into help seeking or

behavioural change resulting in reduced obesity. Mooney *et al* (2010) also identified that most parents reported thinking of changing lifestyle behaviours after receiving child weight feedback; however, it was not known whether actual behaviour change occurred.

Although the current study identified that feeding back child weight status to families might be a good idea as long as it is done sensitively, aiming at getting parents on board to support interventions aimed at combating childhood obesity, it is worth noting that the issue of weight feedback has been debated for many decades especially in developed countries. The Foresight report (2007) overtly criticised this strategy of sending weight feedback to families, for example, because it engendered a feeling of personal responsibility for obesity rather than promoting a more contextualised approach that focuses on the role of the environment and society in causing obesity. While the potential for individual weight feedback to engender such feelings of personal responsibility cannot be underestimated, it is argued here that not sending weight feedback to parents/guardians and their children would not help the families either; and the negative consequences of not getting parents/guardians on board to support interventions aimed at combating childhood obesity could be potentially more damaging.

For instance, Chi-square tests on the survey data identified very strong evidence for the association between dieting habits and perceived weight status of children. Children perceiving themselves as very overweight were more likely to report being on a diet to try and lose weight. This is consistent with Hill's (2004) argument that feeling obese causes dieting. Moreover the survey also found that children perceiving themselves to be overweight/obese were more likely to have low life satisfaction scores. What this indicates is, that without feeding back the true weight status of children, it is quite possible that negative outcomes such as many children ending up going on a diet when actually they shouldn't be are likely; this could create potential growth problems. The current study therefore provides empirical evidence to support the importance of routinely feeding back child weight status to families in order to avoid likely negative consequences.

The findings from the current study support the growing body of evidence suggesting that routine feedback of the weight results to parents may be of great importance since evidence points to the fact that many parents are unable to identify

their children as being overweight (Cross-Government Obesity Unit, 2009; Grimmett *et al.,* 2008; Mooney *et al.,* 2010; Nihiser *et al.,* 2007; Wald *et al.,* 2007).

Qualitative accounts of parents/guardians in the current study attested to the fact that there is an increasing shift in the average weight status of children towards overweight and obese and that this is observable in the communities; for instance one parent noted that '*looking back a generation ago there are a lot more children who are overweight now than there were back then'* (parent 03). This shift has also been reported by other researchers (Luttikhuis *et al.,* 2009; Shucksmith *et al*., 2009; Summerbell *et al*., 2005). This study identified that most parents/guardians have lost the ability to judge the true weight status of their children. Parents constantly rely on comparison of children with their peers in the same age range to estimate their child's weight status. However with the changing trends in the average weight of children towards overweight, it is quite likely that misperceiving child weight status among many families will become more common.

It is therefore not surprising that many parents/guardians argued that it had never occurred to them that their child was overweight; given that their child seemed no different from others in the class. This could indicate the extent to which many families are disconnected from the reality regarding true child weight status. Literature also indicates serious misconceptions about the ideal weight, especially where almost all people in the family and in neighbourhoods are overweight (Baughcum *et al*., 2000; Etelson *et al*., 2003; Jones *et al.,* 2011; Mooney *et al.,* 2010; Vanhala *et al.,* 2011). In contrast however, Boutelle *et al* (2004) found that mothers could accurately identify the weight status of their adolescent children and thus concluded that they did not need to be reminded that their child was overweight or obese. A significant difference was that Boutelle's study investigated mothers of adolescent children; this age difference could account for the difference in the findings.

It is therefore not inappropriate to postulate that there is a genuine misperception of child weight status among the families of younger children. Shucksmith *et al* (2009) provided some clues to explain this phenomenon. They argued that most parents are usually not concerned about their child's weight status as long as the child is happy, active and plays; they only get bothered when their children are unhappy or when they get teased. This could explain why parents/guardians in this study did not take their child's weight status as an issue until they received a weight feedback

letter from Gateshead PCT. The association of obesity with ill health is one that public health practitioners make on the back of epidemiological data of the health challenges facing obese adults. Most slightly overweight and even obese children maintain good health in their childhood and youth, and parents can thus perhaps be forgiven for overlooking the health risks to children who seem overtly fit and are functioning well.

The child weight feedback letter engendered feelings of blame amongst the individual families in this study. Whether or not this could account for the cycle of emotional reactions experienced by most parents/guardians whose children were identified to have weight problems is a question to which the next section provides some clues.

7.2.4 Cycle of reactions to the news of child weight status feedback

The current study identified a sequence of behaviours that parents/guardians undergo when they received their child's weight feedback. As discussed in the previous chapter, responses vary depending on the category of weight status in which the child is placed. However, emphasis here is put on the response of parents/guardians whose children are indicated to have weight problems because it could be important in determining the right time at which interventions need to be introduced for better outcomes. It was observed that parents/guardians of children with weight problems seem to go through five distinct stages, each characterised by a set of reactions and behaviours. This has been described in detail in Chapter six. In the first stage when parents/guardians have just received the weight feedback, there is evidence of shock, disgust, upset and anger. Subsequently many parents either throw away the feedback letter in the bin or hide it out of sight of their children. This sort of reaction is not surprising for a number of reasons. First and foremost, society too often associates being overweight/obese as being equivalent to being stupid, lazy and unable to control oneself. Hill and Silver (1995) discussed the negative attributes society holds towards overweight and obesity. Therefore parents are unwilling to consider their children to be overweight because they reject the associated negative attributes. Ultimately this could explain why the news of the child being overweight/obese is upsetting, disgusting and annoying. Boutelle *et al* (2004) also discussed the unwillingness of parents to consider their children obese or overweight even when they recognised it in their children. But there could also be a genuine inability among parents/guardians to distinguish overweight/obese from normal weight among children, as already discussed. This could be central to the observation made in the current study that parents/guardians receive the news of

their children being overweight/obese with utter surprise, as they genuinely previously thought that their children were ideal weight.

In the weight feedback reception process, stage 1 is followed by a second stage, characterised by denial, rationalisation and rejection. Most parents/guardians usually choose to ignore the feedback letter and sweep it under the carpet and pretend it did not arrive. This is followed by stage 3, which is characterised by self-blame and later on acceptance of the feedback. This is when parents/guardians begin to talk to family and friends about the letter. Sooner or later parents/guardians realise that just sweeping the matter under the carpet is not going to be of any help. They reflect on family lifestyles, identifying potential causes of their children being overweight/obese. In so doing they come to accept that there is a possibility that their child is actually overweight/obese. Evidence from the current study indicates that parents/guardians (especially mothers) at this stage put the blame entirely on themselves. This creates anxiety, worry, panic and fear which are the characteristics of the 4th stage of the weight feedback reception process. Up to this stage, the process is spiralling, with continuous regression to and from the previous stages. Finally parents/guardians appear to come to terms with it and they start to seek help, and this happens in the 5th stage of the weight feedback reception process. The current study investigated where parents/guardians go for immediate help. Most parents/guardians reported seeking help from their immediate family such as grandparents of children, aunties etc. Some parents/guardians reported relying on family friends and neighbours for help regarding their child's weight status. A minority of parents mentioned getting on the phone to try and find some help; however they did not specify which services they actually contacted.

Exploring the entire process parents/guardians go through when they receive weight feedback for their children could provide a vital step in identifying the best timing for interventions and how best to follow up the weight feedback letter in families where children are indicated to have weight problems. In reviewing the literature, no studies exploring the process of weight feedback reception were found. However several commentators have suggested that sending the feedback letter with some materials outlining different choices to the parents/guardians could be important (Crawford *et al*., 2006). However, although such materials were sent out with letters in this study, most parents/guardians reported that they had never seen any materials. There is the possibility that parents/guardians threw away these materials.

The current study has indicated that the best timing for sending out these materials which suggest different options and choices to the parents could be during stage 5 of the weight feedback reception process when the parents/guardians have gone through all the other stages of shock, denial, self-blame, acceptance and they are finally ready to receive help. Although a gap in knowledge still exists as to how long it takes parents/guardians to get to stage 5 of the weight feedback reception process when they are ready to receive help, it is quite clear that targeting interventions at this stage could produce more positive outcomes. Parents/guardians are more likely to read these materials and there is a high chance that they can take on board the different suggestions made in the materials. Although this introduces another cost (having to send two different mailings), sending these materials together with the feedback letter in one package if they end up in the bin does not help either; suggesting that this might be a more cost effective alternative in terms of the outcomes.

Mooney *et al* (2010) studied the early experience of routine feedback to parents using telephone interviews. They made observations similar to those made in the current study; however, they did not conceptualise a process of reactions and behaviours following reception of weight feedback by parents. By identifying this process, the current study adds significantly to the understanding of this complex issue. Yet, making similar observations in the behaviours of parents/guardians in the two studies based on completely different populations and using different methods of investigation could indicate true occurrence of the phenomenon in reality. It is therefore possible that weight feedback truly causes anxiety to those families whose children are indicated to have weight problems.

But in terms of breaking this anxiety, an alternative strategy might be for health authorities to work with educators to situate the whole measurement process within a school curriculum setting, as some parents suggested to be preferable. If the NCMP could become part of a broader health promotion package teachers could work with the children over a longer period on issues relating to the 'obesogenic environment' and how they should respond and handle their own behaviour; during such episodes children could weigh themselves, compare weights and heights (if they wish) and discuss within a broader perspective of healthy lifestyles. At some point in the module, the objective weight and height measurements for the NCMP could be taken. In this way it would be something children and their parents are

familiar with and parents are more likely to respond well to the feedback that comes from these objective measures taken as part of the education of their child. Ultimately this could enable considering feeding back child weight status at the school level rather than at the individual level. This has the potential to enable schools to think of school level interventions such as breakfast schemes, encouraging school walks, integrating more physical education (PE) in the curriculum and improving overall physical activity levels for children. This could not only prevent the panic and worry that comes with individualising the weight problem when feedback is sent to individual parents/guardians, it could also promote universal approaches which are advocated by many researchers, commentators and health professionals in the struggle against childhood obesity (Power *et al.,* 1997).

Although, the discussion so far has identified that the NCMP, particularly weight feedback, could have a negative impact on the mental wellbeing of children indicated to have weight problems, the important question to address here is whether this process has the potential to bring about changes in behaviour, despite the negative consequences. If the answer is 'yes', then it is important to identify whether or not the behaviour changes occurring are positive. The next section discusses this aspect.

7.2.5 Role of routine weight feedback in influencing behavioural change

The current study identified behavioural changes that occurred as a result of the weight feedback. In the first place, the weight feedback letter was identified as a very important factor acting as a spur to many families to think of adopting healthy lifestyles. Inducing families into a state of readiness to change is pivotal in any health promotion interventions. If the weight feedback letter is one of the factors that could induce families into the state of readiness to change then it should be supported; notwithstanding the need to take special care to ensure that the message is put across sensitively and in a correct way to minimise as much as possible any panic and annoyance among families which could create undesirable outcomes.

As already discussed in Chapter six, most parents/guardians reported observing some changes in the behaviour of their children after participating in the NCMP, ranging from increased curiosity about monitoring their weight status, to changes in the choices of what children eat. Most of these changes were positive, with children preferring to eat more fruit and vegetables than chocolates or snacks. Such

changes, however, were more common among children who had been indicated to have weight problems. Children too reported changing their attitudes towards food choices, with more preferences being put on healthier choices such as fruit and vegetables. Although it is arguable that these changes could have been due to factors other than the weight feedback letter indicating them to have weight problems, it is still possible that these change were due to the weight feedback. However, if it is true that the weight feedback led to these changes, then the important aspect to consider is the sustainability of these behavioural changes. This is an important aspect that could not be addressed in the current study, however, this observation could be the starting point in identifying possible interventions that could lead to positive behavioural changes in many families, whether affected by childhood obesity or not.

However, several authors argue that simply telling parents the weight and height measurements of their children may be only the first step in a much longer process of reversing or changing family behaviours (Foresight, 2007; Howard, 2007). Some evidence from the USA, where routine feedback of BMI results is mandated in some states, indicated some very undesirable outcomes from screening, including unsupervised medication of young children with adult diet pills, restriction of nutrition (even for normal weight children) leading to potential growth problems and so on (Ikeda *et al.,* 2006). But the evidence from the current study shows that it largely depends on the way the message is put across to families. If the issue of weight status is portrayed as a medical one, it is quite likely that parents/guardians would think of things like medication to give to their children whereas if it is portrayed as a social issue, then families are likely to think of changing lifestyles. The current study did not find evidence of any such very undesirable outcomes as a result of feeding back weight status to families. However one observation that was common was the increase in restriction of what the child could and couldn't eat. This could be a negative outcome for children who are of ideal weight, whereas it could be a positive outcome for children who are obese/overweight.

One of the important aims of the current study was to identify what families do when they receive child weight feedback. The review of literature did not identify clearly what families do when they receive the weight feedback although some studies suggested some changes in behaviour (Mooney *et al.,* 2010). The current study clearly identified the unwillingness of parents/guardians to visit medical professionals about their child's weight status, but as in the study by Mooney *et al*

(2010), it did not identify substantial evidence for the sustainability of the observed changes in health behaviour. What the current study clearly identified was the strong willingness to change health behaviour among families, yet actual change in behaviour seemed to be strongly hampered by the lack of knowledge of the system and how to find help within it. Most families found the NCMP process too complicated. It was clear that they did not know where to go for help and who to contact. Although the PCT letter indicated to them where they should go for help, namely - their family doctor; it seems the PCT may be pointing families in the wrong direction. While health authorities inevitably medicalise the issue of child weight status, families do not view child weight status as a medical problem. As already mentioned, child weight status is viewed by families as a social problem, and this explains why almost all parents did not consider seeing the GP about their child's weight status.

While it is evident that parents/guardians are willing to get their children onto social programmes that could increase their child's physical activity levels, cooking skills and the likes, it came out quite clearly that such programmes are absent or few in number in the vicinity of many families. Yet undoubtedly these are what the parents see as the drivers of change regarding their child's weight status rather than visiting GP surgeries, school nurses etc. A lot of parents/guardians reported lack of facilities within walking distance that their children could utilise. This was more commonly reported by parents/guardians in deprived areas. Families from affluent areas often reported having facilities in their vicinity; however reasons such as child safety hampered them from letting their children fully utilise these.

The current study identified that weight feedback could have induced many families into a state of 'readiness to change', as many families reported planning on increasing physical activity levels, improving diet etc. Whether these plans have been effected in the families is something that would need further robust longitudinal studies. However, it is important to note that health messages along with interventions need to be preceded by readiness to change among both parents and children. Yet due to the nature of the content of the feedback letter, many parents especially those whose children had been indicated to have weight problems ended up opting not to show this letter to their children for fear of scaring, worrying and frightening them; which could potentially impact on their attitudes towards food and exercise.

But if it is true that the feedback letter has the capacity to induce families into the state of readiness to change, there is no doubt that in this situation, parents/guardians who have seen the letter would be in the state of readiness to change while their children would not be, since they are unlikely to have been shown it. It is possible that parents/guardians would be wanting their children to change their eating habits, exercise habits etc while children would not know the reason why. It is therefore of paramount importance to get both parents/guardians and their children in the state of readiness to change together, before any interventions are brought in.

Inevitably first steps should involve attempts to re-word the weight feedback letter in a neutral tone so as not to lay individual blame on anyone or to scare, worry or frighten children. When this feedback is accepted in families, then interventions aimed at changing behaviour towards adopting healthy lifestyles can be brought in. In such a situation there is a high chance that these interventions would be effective. But above all child weight problems should be addressed in a wider social context, with environmental risk factors identified and dealt with.

If, in summary, it is felt that sending child weight feedback to families is indispensable in the fight against childhood obesity, attention must then be turned to the best ways in which weight feedback letters could be prepared, the best interventions that could follow the weight feedback and how best weight feedback could be made known to parents/guardians and their children without creating unnecessary panic, worry and annoyance, as the next section identifies.

7.2.6 Preparing the weight feedback letter and timing of the letter – a medical or a social approach?

The tone of the weight feedback letter largely depends on whether childhood obesity should be viewed as a medical problem or a social one. If it is viewed as a medical problem, capable of causing immediate harm, then parents/guardians would need to be alarmed so that they can wake up to the fact that they need to do something about their child's weight status. However if it is viewed as a social problem, then the letter might be better to adopt a neutral tone, providing parents/guardians with information recognising the complex nature of the environment in which children live and suggesting to parents the best ways of supporting their children to adopt a healthy weight in a simple tone.

Several attempts have been made in earlier studies to identify some factors that could be avoided in preparing the feedback letter. Strauss (2002) discussed how some terms used to describe weight status are regarded as derogatory and would cause psychological harm to those deemed to have a weight problem; such terms include 'fat' and 'obese'.

The current study identified further factors that instigated unnecessary panic and annoyance among parents/guardians. It became clear that sending the weight feedback letter with words such as overweight/obese in **bold lettering** only added to the insult of labelling children overweight/obese in the view of parents/guardians. Highlighting such terms is interpreted as judging parents and placing blame on them. It shifts the entire problem of childhood obesity from the wider socio-perspective and places blame on individuals who have little control over the 'obesogenic environment' that promotes childhood obesity. Cohen *et al* (2005) also argued that overemphasising 'obesity' has made this complex issue appear simple. In this way, the obese and overweight individuals have been held responsible for their condition without acknowledging the contributing social and economic factors in their homes, places of work or recreation. Children in particular can do little to change the environment they grow up in and the set of behaviours they adopt. Holding the obese children responsible for their condition is not only unhelpful, but can potentially push them in the direction of behaviours that continue to exacerbate the condition of obesity. Wadden and Didie (2003) argued that such practices can potentially draw those with the problems further away from the help they would have got.

The current study also identified that implicitly linking obesity to fatal illnesses in the feedback letter is one of the factors that created unnecessary panic and annoyance among families. In the first place it is arguably morally wrong to tell a child of 10 -11 years that they are more likely to die of **cancer**, diabetes, cardiovascular diseases etc if they do not stop putting on weight. Apart from creating unnecessary panic among families, it served to medicalise the whole issue of child weight status. It is perhaps not surprising that the PCTs recommended that parents/guardians visit GP surgeries and school nurses, but it could be argued that it is disingenuous, given the lack of preparedness of the one service and the under resourced nature of the other (McMeniman *et al.,* 2011). It ought to be understood that from the parents'/guardians' point of view, child weight status is not a medical problem; parents/guardians do not see it as necessitating visiting GP surgeries. This

disconnection in the way of thinking about child weight status between the health authorities including those running the NCMP and the parents/guardians is only likely to lead to conflicts and negativity regarding the interventions aimed at combating child weight problems.

Arguably weight feedback, given that it does inform children and their parents about the weight status of a child, could be one of the factors that might potentially induce families into the state of readiness to change their behaviour towards adopting healthy lifestyles. In the qualitative interviews conducted in the current study, it was identified that receiving the feedback letter indicated the point when the 'penny drops' for many people to realise that they needed to change their lifestyle behaviour; as many parents/guardians reported thinking of adopting healthy lifestyles after receiving the weight feedback letter. But the important thing is to realise the sensitivity of weight issues in contemporary society and identify the best way of raising awareness among parents about weight issues but without causing annoyance to families.

This study identified that the current way of preparing the weight feedback letter for parents has not been the best; advising parents/guardians of children who were indicated to have weight problems to visit the GP or the school nurse was the wrong thing to do. It is therefore not surprising that many parents/guardians whose children had been indicated to have weight problems reported never having considered seeing the GP or the school nurse about this issue. However contrary to these findings, Mooney *et al* (2010) reported that half of the parents in their study planned to consult their GP when they received their feedback letter. It is however not clear whether or not these were parents of children indicated to have weight problems. It could also be that, since interviews were conducted over the telephone, these parents could have just mentioned what they thought the interviewer wanted to hear, for fear of being misjudged. This was clearly not the case in the one-to-one semi-structured interviews conducted as part of this study with the parents of children indicated to have weight problems in Gateshead.

Consequently, it is argued here that 'the way of saying it' in the feedback letter matters more than 'just saying it'. It seems as if the current practice has been focused on just 'saying it' and not putting emphasis on the way it is being said. Rather than aiming to alarm parents/guardians, emphasis could be put on providing support to parents/guardians on how they can operate in an 'obesogenic

environment' which is unlikely to change drastically for the better in the near future. This point has also been reiterated by other researchers (Lawrence *et al.,* 2010).

The main concern of parents/guardians is how they can bring up their children in a better way. Therefore parents need to be supported on how they can for instance say 'no' to a child demanding sweets, or resist the purchase of advertised junk foods without necessarily creating conflict with their children or without being seen as depriving these children of the right to be like others in their peer group.

7.3 Validity and trustworthiness

Validity in research refers to the degree to which the conclusions, inferences or propositions drawn about the different parts of the study are true. This term has been more commonly used in quantitative research. External and internal validity are important aspects in quantitative research. It is of importance to identify how they were achieved in the quantitative part of the current study.

7.3.1 External validity

External validity refers to the degree to which the results of a study can be generalised to settings or samples other than the ones being studied. The generalisability of the findings depends on four major factors which are discussed below in the context of the current study.

7.3.1.1 Sample size

The quantitative survey in the current study involved a total sample of 264 children and this was considered large enough to enhance the external validity of the findings. Sample size was derived using power calculations described in Chapter four. It is perhaps not surprising that most of the findings from this survey such as the prevalence of mental health problems are in line with the findings from the other larger surveys conducted by Green *et al* (2005) and Meltzer *et al* (2000) that used larger samples representative of child populations in England, Wales and Scotland discussed in sections above.

7.3.1.2 Sample characteristics

It is important to examine the extent to which the sample reflects the population from which it was taken. The survey in the current study involved a sample of children aged between 10-11 years old. The sample was gender balanced with 55.3% girls and the rest boys, the socio-economic status of children was mixed with children

coming from the three classes of deprivation namely: high deprivation, moderate deprivation and low deprivation.

7.3.1.3 Sampling method

Participants were selected using a proportionate stratified random sampling technique. Participating schools were classified according to deprivation status using percentage of children on free school meals in a school as a surrogate measure of poverty. Each school in the entire Gateshead council had an equal chance of being selected. However due to the 'opt-in' requirement of ethics, children who completed the questionnaire were those that volunteered to take part.

7.3.1.4 Study settings

The quantitative survey in the current study was conducted in primary schools in the Gateshead local authority area. The questionnaire was completed by children during school time. These settings are considered to be the usual settings of the children targeted and this also enhances the external validity for this study.

7.3.2 Internal validity

The quantitative survey in the current study used standard scales to measure mental wellbeing of children. These scales have been described fully in Chapter four and they included the 25-item self-completion Strengths and Difficulties Questionnaire (SDQ) and the 12-item General Health Questionnaire (GHQ-12). These scales were presented along with a few other questions that investigated biographical details of children as well as their interests. The standard scales have been shown to be highly valid in measuring mental wellbeing of children and hence offer high internal validity for the current study. The term validity is not a concept that is normally applied to qualitative research. Instead the term trustworthiness is used in qualitative studies to relate to validity and reliability. Chapter four described how trustworthiness was achieved in the current study.

7.4 Reflexivity

Hardy *et al* (2001) defined reflexivity as a process that involves reflecting on the way in which research is conducted and how the process of conducting research shapes the outcomes of the research. They argued that reflecting upon the ways in which the researcher's values, experiences, interests, beliefs, political commitments, wider aims in life and social identities have shaped the research is absolutely necessary. Reflexivity is two way; it is not only concerned with how the researcher may have

influenced the research. It also involves thinking about how the research may have affected and possibly changed the researcher him/herself. It is almost delusional to deny subjectivity and its impact on the outcomes of the research. As such, through all the steps of the research process it is important to make transparent the effect of the researcher on each of the aspects of the research. The main topic in the current study was child weight status and mental wellbeing. Before starting the study, the researcher held views about child weight status and mental wellbeing similar to those displayed in the media. Consequently the researcher believed that childhood obesity was a real epidemic and that it was an issue of individual responsibility, especially on the part of families with obese children to work out a solution to fix this problem. The researcher also believed that child mental health problems were out of control just as it is portrayed in the media too. However working on this research project has made the researcher realise that the notion of childhood obesity is more akin to a 'moral panic' rather than a real one. While the government and the media like to portray childhood obesity as a medical problem, parents/guardians and their children are more likely to see it as a social problem. Because of the preconceptions of the researcher about child weight status issues, the researcher had to re-work the interview schedules over and over again to eliminate any intrinsic bias relating to considering that families with obese children need to take personal responsibility for it. Likewise the researcher has come to realise that mental health problems could be nothing more than normal growth patterns of children. It is quite likely that giving these behavioural patterns medical names transformed them into mental health problems. Most parents do not see some of these behavioural patterns as medical problems, instead they believe that these are just part of the normal growth patterns. The experiences in the study have therefore shaped the researcher's perception of child weight status and mental wellbeing differently. Similarly, the researcher held the view that school-based screening and monitoring programmes such as the NCMP were probably unnecessary and might simply be a waste of resources. However by the end of the study, the researcher had come to realise that these programmes, particularly the NCMP, offer some advantages and could be critical as far as control of childhood obesity is concerned. Although there is no guarantee that the previous perception about child weight status, mental wellbeing and the NCMP by the researcher could not have influenced some of the conclusions drawn in the current study, efforts were put in to minimise as much as possible the influence of these perceptions on the conclusions of the study.

Of note, the demographic characteristics of the researcher/interviewer have been considered by Hardy *et al* (2001) to have the potential to influence data collection and analysis in qualitative studies; it is therefore of importance to reflect on them. The researcher is a male, young to middle aged person of African descent; with background training in education and public health. It is possible that he could have appeared as a stranger to the interviewees which might have affected the way they responded to the interview questions. For children in particular, as an adult one would always appear as an authority figure, a fact which has the potential to deter them from being honest in their communication. Although these factors have the potential to impinge on the quality of data collected, different strategies were put in place to minimise their impact as much as possible. The researcher made contact with participating schools before the time for data collection and established rapport by participating in different school activities. For example in some schools the researcher developed and implemented a programme called the Africa Week. In this the researcher worked with children on different activities that demonstrated the African culture such as dances, weaving matts, preparing foods. Children were fascinated by this programme and it was voted the innovation of the year in those schools. Consequently parents/guardians got to know the researcher as they attended a show about African culture at the end of the week performed by their children. Other initiatives involved the provision of 'goodie bags' for children who were taking part in the questionnaire survey. These initiatives had the intention of breaking down the barriers that existed between the researcher and the participants which in turn reduced the possible effects of the researcher's characteristics on the data collection, but ultimately one has to accept that 'differences' of all kinds will lead to participants potentially responding uniquely to different researchers.

7.5 Limitations of the study

Like any other study, the current study had some limitations that could warrant caution when interpreting findings from the study. Three possible limitations of the study are discussed below:

7.5.1 Bias due to the use of 'opt-in' consent

Children were recruited into the study using 'opt-in' consent; this was due to the requirements of the ethics approval process. However, this meant that a number of children were eliminated from the study because their parents/guardians could not find time to read the information sheets and sign the consent letters. An informal discussion with school authorities revealed that many parents/guardians in areas of

high deprivation are reluctant to return signed documents back to school. The implication of this is that the representativeness of the current study sample in terms of socio-demographic characteristics might have been affected.

7.5.2 Bias due to determination of deprivation status by aggregation

Deprivation status was determined by use of the percentage of children eligible for free school meals as a surrogate measure for poverty. This meant that, for instance, all children in a school that had a high percentage of children on free school meals were taken to be highly deprived. Although this has the potential to affect some statistical analyses, it was the best option for estimating the socio economic status of children. Asking children about their parents'/guardians' source of income or the occupation of head of household would be an alternative; however, it was thought that most children would not give accurate information in this respect.

7.5.3 Bias due to the inability of the PCT to supply child weight status data

Because of ethical issues, the researcher could not access the weight status data of children directly from the PCT. Parents/guardians were therefore asked to volunteer the height and weight measurements received from the PCT on a short data collection form which was sent to them soon after routine feedback was sent out by the PCT. In such a situation, it is difficult to eliminate the possibility of errors. This could have an impact on some of the statistical analyses; however, this was a limitation that could not be avoided due to ethical issues, but attempts were made to double check the children's height and weight against the subjective judgement of the researcher by looking at the individual child. Those children whose height and weight measurements appeared clearly to be controversial were taken out of the analyses.

7.5.4 Bias due to absence of child weight/height data

Most parents/guardians, especially those whose children had been indicated to have weight problems, had chosen not to show their children the weight feedback letter. These parents/guardians elected not to complete and/or return the demographic data collection form to the researcher. This reduced the response rate, increased the number of children for whom the PCT reported weight/height data was missing, and, overall, reduced the power of the study. It is therefore possible that the observation of a stronger association between perceived weight status and mental wellbeing compared to the actual weight status could be attributed to the lower power of this part of the study.

Overall, although there were these limitations, this study uncovered several important aspects regarding child weight status and mental wellbeing, the interpretation of which cannot be affected by the above mentioned limitations, thus significantly contributing to knowledge, as the next chapter identifies.

Box 7.1Summary of key messages in the discussion chapter

- Evidence from the current study points to the fact that weight status problems only impact on the mental wellbeing of a child when he/she believes they are obese or overweight.
- Most children misperceived their weight status and this could be due to the general shift in the average weight status of children towards obesity and overweight over the past decades.
- Feeding back weight status of children to parents and children caused annoyance, panic and worry among parents whose children were indicated to have weight problems.
- However there was evidence that this feedback could act as an important spur to parents and children to think of adopting healthy lifestyles.
- The weight feedback was identified to have the potential to induce many families into a state of 'readiness to change' which is a key aspect as far as changing people's lifestyle behaviours is concerned.
- The evidence from the current study therefore indicates that it is necessary to carry on measuring children and feeding back their results. However, there is a need to review how the message is fed back.

Chapter 8 – CONCLUSION

8.0 Overview

This section presents the conclusion of the study conducted in Gateshead primary schools. First it spells out the key contribution of the study to knowledge. It then presents the implications and recommendations for practice and/or policy before outlining several suggestions for future research.

8.1 Contribution of the study to knowledge

Essentially, the current study has indicated clearly that there are negative outcomes from the measurement process (emotional distress amongst parents and children, children over-sensitised about bodies/weight, potential stigmatisation amongst peers), yet it is worth it despite the negative outcomes, because 'something needs to be done' (for individual health and for society generally). It is argued here that the negative outcomes may lead to gain because the measurement process could be the trigger that leads to behaviour change. So it is necessary to carry on measuring and feeding back, but there is a need to review how the message is fed back.

Particularly, there were eight major original contributions of new knowledge that the current study identified. These are discussed in the sections that follow.

8.1.1 Evidence for the relationship between mental wellbeing and weight status and the impact of participation in the NCMP.

The findings from the current study add substantially to the understanding of the relationship between mental wellbeing and weight status among children aged between 10-11 years old. The evidence from this study points to the fact that weight status problems only impact on the mental wellbeing of a child only when they are known or perceived by the child. For the first time, the current study has identified that the important variable in the association between weight status and mental wellbeing of children is the perception a child holds towards him/herself regarding weight status. Logically, overweight children who perceive themselves as ideal weight are not likely to be troubled by their weight status while normal weight children who perceive themselves as overweight are likely to be troubled by weight status. It is therefore not surprising that this study found strong evidence for the association between mental wellbeing and perceived weight status while there was no association between mental wellbeing and actual weight status.

With regard to the impact of participation in the NCMP, the current study enhances our understanding of some of the psychosocial impacts produced by participating in school-based screening/monitoring programmes. This study identified that such programmes have the potential to over-sensitise children about weight issues, and for families with children indicated to have weight problems, there is clear evidence that the programme induces worry, anger and panic in the short term.

8.1.2 Evidence in support of parents'/guardians' inability to observe weight problems in their children

The current study has provided further evidence to support the view that parents/guardians are increasingly losing the ability to identify weight problems among their children. It has been identified that parents/guardians rely on comparing their children with their peers to judge their weight status. Parents/guardians reported that it had never occurred to them that anyone would consider their children overweight/obese based on the argument that their child was the smallest in the class. The prevalence levels of childhood obesity mean that parents/guardians will genuinely continue to misperceive their child's weight status, if they continue to base their view on comparison with their children's peers.

8.1.3 Evidence in support of routine feedback of weight status

The findings from this study provide evidence to suggest that sending weight feedback to families can significantly improve the awareness of many families about weight issues. For the first time, the current study has provided empirical evidence from primary research in natural settings in the North East of England, to support the recommendation of the Department of Health of the UK government for PCTs to routinely feed back height and weight measurements of children to their families with a view to bring to their attention child weight problems and encourage them to support government interventions to combat these problems. It is argued here that, although sending weight feedback to families could have potential negative side effects, not sending it provides no positive outcomes, and could worsen an already bad situation.

8.1.4 Evidence for the cycle of emotional reactions following reception of weight feedback

This study, for the first time, has made a step in exploring the pattern of behaviour and reactions that parents undergo when they receive weight feedback. This process, termed here the weight feedback reception process, is characterised by a

series of stages with different reactions and behaviour specific to each stage. Reactions depend on the category of weight status in which the child has been placed. While parents/guardians of children indicated to have the correct weight status range from happiness through self-congratulation to 'othering'; parents/guardians with children indicated to have weight problems receive child weight feedback with anger, disgust and annoyance in the initial stages, but end in help seeking in the final stages. The study also provides evidence that the best stage to introduce interventions is the fifth stage when families are ready to change. Otherwise introducing interventions at any earlier stages could potentially lead to wastage of resources as families wouldn't be willing to receive support.

8.1.5 Evidence in support of the role of routine feedback in triggering behavioural change

The current study has gone some way towards enhancing our understanding of behavioural change involving the adoption of healthy lifestyles as a result of participation in the NCMP. The findings in the current study identified the weight feedback letter as one of the key factors that can potentially induce families into a state of readiness to change regarding lifestyle behaviours. Signs of willingness to change were observed among participating families. Parents/guardians of children indicated to have weight problems reported positive changes in choices of children regarding healthy eating and exercising. However the study identified a lack of proper structures to provide support to those who are ready to change in order to effectively change their behaviour. Apart from the lack of knowledge and understanding of how to find help within the health system, parents/guardians find the whole system complex, non-transparent and confusing. Sustainability of the observed signs of changes was also untested.

8.1.6 Evidence for the source of support regarding weight issues

One of the important discoveries of this study is where parents/guardians go for support regarding child weight status when they need it. The suggestion made in feedback letters that parents should consider visiting GP surgeries was considered, on the basis of evidence here, inappropriate. It was clear from the study that parents/guardians would never consider going to the GP in relation to their child's weight status because they don't see child weight status as a medical problem, but rather a social one. Parents/guardians therefore seek help from their immediate society, for example family members like grandparents of the children, family friends and others in the neighbourhoods. Health authorities need to realise this and find a

way to empower people within communities to provide support to those families identified as having children with weight problems.

8.1.7 Evidence for the impact of the 'obesogenic environment' and changing patterns of parenting

This study has also added to the growing body of literature suggesting that the increasing numbers of fast food shops, advertisement of junk foods targeting children etc are making it difficult for many families to make the right choices regarding healthy eating. Parents/guardians in this study agree that other factors contributing to the 'obesogenic environment' such as technological advancement could be behind the recent increase in childhood obesity. An important discovery made in this study is that parents desperately need to be provided with support about how to negotiate parenting amidst this 'obesogenic environment'. It was clearly identified that parents/guardians recognise the changing patterns of parenting. Parents/guardians are always caught in the dilemma of choosing either to police their children in which case they restrict the freedoms of children, or teaching children to police themselves, meaning children's freedoms are not restricted; in which case parents/guardians risk being labelled bad parents.

8.1.8 Evidence for the correlation between the SDQ and the GHQ-12

The current study has been able to show that the 25 –item self-report Strengths and Difficulties Questionnaire (SDQ) is highly correlated with the 12-item General Health Questionnaire (GHQ-12) in determining mental wellbeing among children aged between 10 – 11 years old in terms of total difficulties, emotional problems, conduct problems and hyper-activity problems. However it has also shown that the GHQ-12 may not be as good as the SDQ in determining pro-social behaviours among children since the Spearman rank correlation coefficient test indicated no significant correlation between the GHQ-12 total score and the SDQ pro-social behaviour score.

8.2 Implications and recommendations for practice and/or policy

Important implications for future practice have emerged from this study. Four important changes in practice that could be made are discussed in the sections below.

8.2.1 Re-wording the content of the feedback letter

First and most important, health authorities could consider re-wording the feedback letter so that it comes across in a neutral tone, avoiding placing the blame on

individuals, acknowledging the influence of the environment surrounding families and aiming at bringing families on board to support interventions aimed at combating child weight problems.

8.2.2 Adopting a high level of sensitivity in feeding back weight status

Health authorities need to be sensitive while dealing with weight issues. There is a need to understand that highlighting terms like overweight and obese in bold lettering or in any other way only serves to create unnecessary panic, worry and annoyance among families. It undermines the real importance of feeding back weight status results to families as it is interpreted by families as being judgemental, placing blame on individuals and challenging parents'/guardians' parenting abilities.

8.2.3 Portraying child weight as a social problem rather than a medical one

Health authorities need to seriously think about portraying the issue of child weight status as a medical problem. They should understand that parents/guardians and children see child weight status much more as a social issue. Thus recommending parents/guardians to visit GP surgeries because of their children's weight status is not only viewed as unrealistic, but it also portrays the health authorities as being absolutely disconnected from reality in the eyes of parents/guardians and their children regarding weight issues. It is therefore strongly recommended that health authorities find ways of engaging people in communities to provide support for each other regarding child weight problems.

8.2.4 Right timing for interventions following weight feedback

Health authorities have been sending additional materials with the weight feedback letter suggesting to parents where they could go for help; such information is likely to have been discarded along with the original letter. The findings from the current study have shown that most parents did not even see these materials and many confessed that these materials ended up in the bin. Apart from wasting resources, this sort of practice does not achieve any of the goals for which the intervention is set out. A reasonable approach to tackle this issue could be to send these materials separately as a follow up package, sometime after the feedback letter has been sent to the homes of children indicated to have weight problems.

8.2.5 Incorporating the NCMP exercise into a school based curriculum

Health authorities could work with educators to situate the whole measurement process within a school curriculum setting. The NCMP could become part of a broader health promotion package where teachers work with the children on issues relating to healthy lifestyles. Feeding back child weight status could be done at

school level rather than at individual level, and interventions could be planned at school level.

8.3 Suggestions for further research

The current study has not clearly identified what parents/guardians do months after receiving the child weight feedback. What it has been able to show is that just after receiving this feedback most families indicated being more aware about weight issues and were resolving to change lifestyles towards healthy eating and more physical activity. There is therefore need for robust longitudinal studies to follow parents/guardians and their children for a significant amount of time well after receiving the weight feedback to identify what sort of behavioural changes families undergo as a result of receiving the child weight feedback. A mixed methods design could be used for such a project. The qualitative part would involve one-to-one semi-structured interviews with parents/guardians and their children soon after receiving weight feedback from the PCT to ascertain their intended behavioural changes. Six months later, the same participants could be interviewed again to ascertain the behavioural changes that have actually been implemented and this could be repeated one year later. The quantitative part of the project would involve investigating lifestyle behaviours just before weight feedback is received. This could be done by use of methods such as the food frequency questionnaire, physical activity diaries, and keeping records of grocery inventories. At six months and one year later, the same data could be collected to identify any differences in lifestyle behaviours.

The study has also uncovered the important issue of identifying the right timing for introducing interventions after sending the weight feedback to families. Although it is clear that interventions targeted just after sending weight feedback to families would be of little significance, it is not known how long it takes parents/guardians to go through all the stages of the weight reception feedback process to the point at which they can be ready to receive help. More studies need to follow up parents/guardians to establish the exact timing at which interventions can be introduced in families with children indicated to have weight problems, in order to ensure efficiency and effectiveness of the interventions.

Further still, the study followed up children through the entire process of the NCMP but it was not possible to make objective measurements at the end to quantify the changes in child mental wellbeing due to participation in the NCMP. More robust

controlled longitudinal studies would be needed to follow children through the entire process of the NCMP and to make objective measurements at the end point in order to quantify the magnitude of the impact taking part in the NCMP has on the mental wellbeing of children; as well as establishing the causal relationship between weight status and child mental wellbeing. More studies are needed to identify what types of interventions parents/guardians feel would be useful in combating child weight problems; as well as identifying what sort of help parents would want to receive in order to help their children maintain a healthy weight.

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10.0 APPENDICES

10.1 Appendix 1: The self-completion questionnaire

10.2 Appendix 2: Child information sheet

10.3 Appendix 3: Child consent form

10.4 Appendix 4: Consent form for parents – questionnaire stage

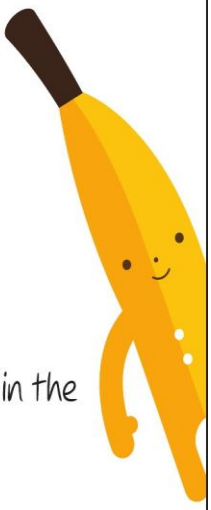
10.5 Appendix 5: Consent form for parents – interview stage

10.6 Appendix 6: Parent information sheet

10.7 Appendix 7: Demographic data collection form

10.8 Appendix 8: Poster for children

Focusing on the Future



Dear year six children,

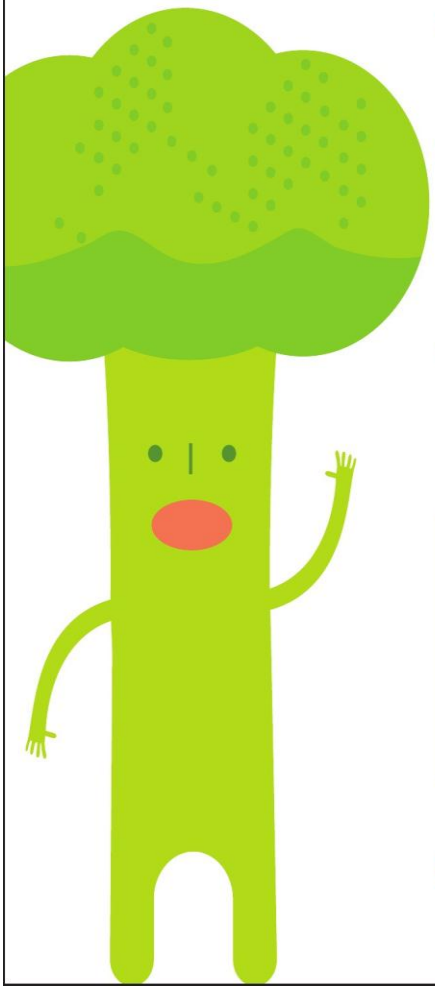
You are being invited to take part in the healthy lifestyles project.

Is this project important?

Yes! The government has decided to measure and weigh all children in year 6, to encourage them to be aware of their weight and health. We do not know what children think about this and whether it helps them to make plans for ways of being healthy.

What will I be asked to do?

- Fill in a questionnaire about your feelings.
- Come along with a friend on another day to talk with us about your thoughts regarding your wellbeing.



Will I be identified?

No! All the information you give us will be kept private and will not be shown to your parents, teachers, friends or anyone else.

What can I do if I would like to take part?

We are giving all children in your year group a letter pack to take home. Read it and then you can let your parents/guardians know whether you would like to take part. If so they can help you fill in a consent form. You will then hand this form to the researcher at school.

What will I get out of this?

We will give a thank you pack to all those children who will take part in the project. All children who complete the puzzles at the end of the questionnaire will be entered into a prize draw.

Thank You!

Teesside University

Teesside University is sponsoring this project for the purposes of research governance

10.9 Appendix 9: Ethical approval

Approved 147/08

Dear Janet,

I received a revised application to the RG&E Committee for your application 147/08 (supervisee Lawrence Nnyanzi) and I am happy to be able to confirm approval for the study on the basis of the revised application pack.

We would offer a couple of comments for consideration below but the study has been fully approved and these are offered as Advisory Notes.
May I ask that you pass on my thanks and appreciation to Lawrence for the professional and exemplary manner in which he addressed the committee's comments and presented the changes made? I am especially thankful to him for the clarity of the cover letter and the very helpful highlighting of the changes he made and the clear explanation where more complex means were employed to address specific comments.

Re the comment and response to - *Section 20: Please provide details of the child incentives* – and the use of the UoT logo elsewhere on study documentation - Please note that under UoT Policy students are not allowed to use the University's logo on any documents. If a student researcher wishes/needs to use the logo then the academic supervisor must send the final approved version of the documents concerned to CCU. CCU will (normally) insert a specially amended version of the logo for use on student materials to those documents and send them back to the supervisor for use. Only the academic supervisor may make such a request.

Re the comment on Appendix 1 *The instruction to parents to complete Consent and Assent Forms and return negates the well-considered statements made in 14a and 17 by apparently removing the child's autonomy.* Please consider deleting the advice to parents to *'...help your child to complete the assent forms …'* as this dilutes (apparently unnecessarily) the child's free and independent choice by inviting the involvement of the parent. It would seem likely, given how well and carefully you have prepared the Assent Form, that children of this age would be able to complete that form, or not if that was their choice, with no need for anyone's help and hence could be left to make a truly independent choice.
You will receive an approval letter in due course and please accept our best wishes for the successful completion of the project.
Regards

Alasdair MacSween Ph.D B.Sc.(Hons) MCSP
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10.10 Appendix 10: Interview schedule for children

PART I: Exploring experiences just before participation in the NCMP.

- Reception of the NCMP invitation letter
- Discussion of this letter with the parents
- Feelings of the child towards measurement
- Reactions and comments of other family members

PART II: Exploring experiences during participation in the NCMP

- Feelings during measurement
- Discussion about the process of measurement
- Perception of the child towards the process
- Comments of parents and other family members about the process

PART III: Exploring general perceptions and feelings

- Feelings about body size
- Likelihood of being bullied/teased over weight issues
- Hobbies of child such as reading novels, watching television etc

PART III: Exploring experiences after participation in the NCMP

- Feelings of the child after participation in NCMP
- Changes in behaviours after participation in the NCMP
- Whether children or their parents were eagerly waiting for NCMP results.

PART IV: Exploring experiences during the feedback process

- Receiving the NCMP results
- Feelings just before receiving the results
- Feelings just after receiving the results
- Reaction of the child after receiving the results
- Comments of other members of the family

PART V: Exploring experiences after the feedback process

- Changes in way of life of the child due to results
- Feeling of worry among the family members
- Whether some help was sought
- The providers of the help
- Which help would be recommended to others

10.11 Appendix 11: Interview schedule for parents

Exploring Knowledge of parents about the measurement process

- Why do you think children are being weighed and measured at school?
- Who do you think is responsible for this whole process of weighing and measuring children?
- Do you find it legitimate to weigh and measure children at school?
- Do you think it is being handled very well?
- Is it something you would want to be done to your child at school? Why?
- Is it something you would want to be done to all children at school? Why?
- Would you want to talk to your child about weight related issues?
- Why do you think your child has the weight they have?

Exploring Experiences just before child participation in the measurement process

- Do you remember receiving a letter from school asking you to give permission to your child to take part in the measurement process?
- What was your reaction about this letter?
- What did you discuss about this letter with your child?
- What were the feelings of your child towards measurement?
- In your opinion is this likely to be the same reaction for all the children?
- What were the reactions and comments of the other family members?

Exploring experiences of parents after child participation in the measurement process

- What did your child say to you after being measured?
- What was the perception of your child towards the process of measurement?
- Did participating in the measurement process change the curiosity of your child towards his/her weight and height?
- Were there any changes in your and/or your child's behaviours after participating in the measurement process?
- What were your feelings during the long wait for the measurement results?
- Were you and/or your child eagerly waiting for the measurement results?

Exploring general perceptions and feelings of parents

- How do you feel about your child's body size at the moment?
- What are some of the reasons to explain your child's weight status at the moment?
- Do you find it quite easy to tell if your child is about the right weight, underweight or overweight?
- Do you find it easy to speak to your child about weight related issues?
- Are you generally happy about your child?
- Do you feel about your child's weight, has it changed since they were young?
- How do you feel about your child's exercise and eating habits?

Exploring experiences of parents during the feedback process

- How did you receive the results from the measurement process?
- How did you feel just before receiving the results of the measurement process?
- How did you feel just after receiving the results of the measurement process?
- How did you deliver these results to your child?
- What was your child's reaction after receiving these results?
- What were the comments of the other members of the family?

Exploring experiences after the feedback process

- Are there any feelings of worry among the family members due to the results of the measurement process?
- Are there any changes in the way of life of the child due to the results?
- Have you sought some help somewhere about your child's weight status?
- Who are the providers of help that have been consulted?
- Which help would you recommend to others and why?
- What next is planned about the child's weight status?

Feelings about lifestyles

- Do you think this measurement process can act as an important spur to families to think of healthy lifestyles?
- Do you think it is important to feedback the height and weight measurement of children to parents and their children?
- Generally what do you make of the whole process?

10.12 Appendix 12: Sample weight feedback letter

NHS
«PCTName»
«Address_Line1»
«Address_Line2»
«Address_Line3»
«Address_Line4»
«Address_Line5»
«PCT_Postcode»

Telephone: «PCT_Telephone»
Email Address: «PCTEmail»

Private and confidential
Parent / Carer of «Child_Firstname» «Child_Surname»
«Child_Address1»
«Child_Address2»
«Child_Address3»
«Child_Address4»
«Child_Postcode»

10 December 2008

Dear Parent/Carer,

Your opportunity to take positive action:
National Child Measurement Programme results for «Child_Firstname» «Child_Surname»

We recently measured your child's height and weight at school as part of the National Child Measurement Programme. A letter about this was sent to you before the measurements were done.

This national programme helps monitor children's health and well-being and aims to make parents aware of any potential problems with their child's weight so that they can seek help if needed. The information we collect is held by your local NHS and treated confidentially. It has not been shared with school staff or other children.

Here are the results for your child at the time of measuring:

Date measured	Date of Birth	Height	Weight	Percentile for BMI (body mass index)
«DateofMeasurement»	«DateofBirth»	«Height2» «Height3»	«Weight2» «Weight3»	«BMIPercentile2»

These results suggest that your child is **«ChildDescription»** for their age and sex. For your child at their age and height, the healthy range is «M2ndkgs» - «M91stkgs» kg («M2ndva «M91stvalue»)

«Childsummary1»

«Childsummary2» **«PCT_Telephone»** and ask to speak to **«PCTLeadContact»** for further advice and information.

The back of this letter shows you how we work out these results and gives you more information on what it means for children's future health.

Thank you,
«PCTLeadContact» («PCTLeadContactTitle»)

The child summary 1 and 2 paragraphs will read as follows dependent on the result:

These results suggest that your child is a healthy weight for their age and sex. For your child at their age and height, the healthy range is XX–XX kg (X st X lbs – X st X lbs).

Children of a healthy weight are more likely to grow into healthy adults. To keep growing healthily into adulthood, it is very important that your child eats well and is active, so that they are healthy on the inside as well as the outside.

The back of this letter shows you how we worked out your child's results, and the enclosed leaflet gives you tips on how to help your family eat well and be active. If you would like more advice about your child's weight and what to do about these results, you can contact your local NHS on **[PCT to add phone number]** and ask to see **[PCTs to add (eg, school nurse, practice nurse, or other)]**.

The back of this letter shows you how we work out these results and gives you more information on what it means for children's future health.

These results suggest that your child is underweight for their age and sex. For your child at their age and height, the healthy range is XX–XX kg (X st X lbs – X st X lbs).

Some underweight children are perfectly healthy. But sometimes being underweight can be a sign of health problems or due to an illness.

The back of this letter shows you how we worked out your child's results, and the enclosed leaflet gives you tips on how to help your family eat well and be active to help everyone achieve a healthy weight. If you would like more advice and information about your child's weight and what to do about these results, you can contact your local NHS on **[PCT to add phone number]** and ask to see **[PCTs to add (eg, school nurse, practice nurse, or other)]**.

The back of this letter shows you how we work out these results and gives you more information on what it means for children's future health.

These results suggest that your child is overweight for their age and sex. For your child at their age and height, the healthy range is XX–XX kg (X st X lbs – X st X lbs).

Being overweight can affect your child's health. As adults, children who are overweight are more likely to have high blood pressure, heart disease, diabetes and cancer. Most children shouldn't aim to lose weight – but, it is important to help your child eat well and be active. Over time, this will help them reach a healthy weight for their age.

The back of this letter shows you how we worked out your child's results, and the enclosed leaflet give you tips on how to help your family eat well and be active. If you would like more advice about your child's weight and what to do about these results, you can contact your local NHS on **[PCT to add phone number]** and ask to see **[PCTs to add (eg, school nurse, practice nurse, or other)]**.

The back of this letter shows you how we work out these results and gives you more information on what it means for children's future health.

These results suggest that your child is very overweight for their age and sex. For your child at their age and height, the healthy range is XX–XX kg (X st X lbs – X st X lbs).
Being very overweight can affect your child's health. Children who are very overweight, doctors call this clinically obese, are more likely to develop diabetes and high blood pressure. As adults, they are more likely to have high blood pressure, diabetes, heart disease and cancer. People who are very overweight are more likely to suffer poor health and die earlier than people who are a healthy weight.

You can help your child by encouraging them to eat well and be active, and the enclosed leaflet gives you some tips about this. However, it is very important that you now seek further advice and information by contacting your local NHS on **[PCT to add phone number]** and ask to see **[PCTs to add (eg, school nurse, practice nurse, or other)]**.

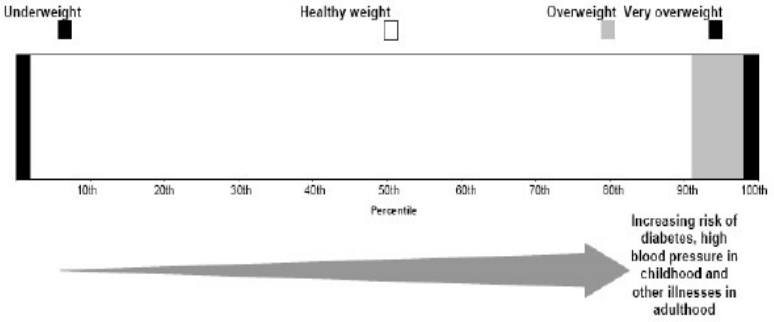
How is your child's result worked out?

Your child's result (whether they are a healthy weight, overweight, very overweight or underweight) is based on a BMI percentile.

BMI percentiles are worked out by:

Step 1: Body-mass index (BMI) is calculated by dividing weight (in kilograms) by height (in metres) squared.

Step 2: Because children are growing, the interpretation of the BMI number depends on the age and sex of the child, so your child's BMI is then compared with the UK 1990 growth charts. These growth charts are based on the BMI measurements of thousands of children in the UK to create charts of normal growth standards for children aged 2–20 years. These measurements are split into 100 units, to give 100 categories, or percentiles, and every child falls into one of these percentiles from 1 to 100.



What are the weight ranges?

The weight ranges shown below are an approximate guide for your child at their age and height.

Underweight	**Healthy weight**	**Overweight**	**Very overweight** (doctors call this clinically obese)
is the 2nd percentile or lower («M2ndkgs» kg [«M2ndvalue»] or less)	is from above the 2nd to the 91st percentile («M2ndkgs» - «M91stkgs» kg [«M2ndvalue» - «M91stvalue»])	is from above the 91st to the 98th percentile («M91stkgs» - «M98thkgs» kg [«M91stvalue» - «M98thvalue»])	is above the 98th percentile («M98thkgs» kg [«M98thvalue»] or heavier).
Some underweight children are perfectly healthy. But sometimes being underweight can be a sign of health problems or due to an illness.	Children of a healthy weight are more likely to grow into healthy adults.	As adults, children who are overweight are more likely to have high blood pressure, heart disease, diabetes and cancer.	Children who are very overweight are more likely to develop diabetes and high blood pressure. As adults, they are more likely to have high blood pressure, diabetes, heart disease and cancer.

Why do we use a BMI percentile measure?

BMI percentile is a measure of weight in relation to height, and gives some information about if a child is a healthy weight for their height, age and sex. It is not a perfect measure, but produces accurate results for almost all children, and is one of the best ways to tell if a child is a healthy weight.